JOURNAL
OF THE
ARNOLD ARBORETUM

VOLUME XVI JANUARY, 1935 NUMBER 1

STUDIES IN BORAGINACEAE, X

THE BORAGINACEAE OF NORTHEASTERN SOUTH AMERICA

IVAN M. JOHNSTON

THE present paper is a critical account of the Boraginaceae known from British, Dutch and French Guiana and the adjoining portions of Brazil, north and east of, the Amazon and the Rio Negro. A general account, it is preliminary to a treatment of the Dutch Guianan species of the family which Prof. A. A. Pulle has invited me to prepare for his "Flora of Surinam."

The borages of the Guianas have been long neglected. Such fragmentary work as has been done on them has been restricted to the narrow political boundaries. Though various species of the group have been described from the Guianas, some of them among the first based upon South American material, the identity of the types has remained obscure, and material in herbaria has continued to be named largely by guess or has been left to accumulate unidentified. The great reference works, such as DeCandolle's Prodromus, or Martius's Flora Brasiliensis, resolve little of the confusion that seems always to have enveloped our knowledge of the Guianan Boraginaceae. They added little to the observations all ready long available in the writings of Lamarck and Poiret. Indeed, so little known and confused were the Guianan species of *Cordia* and *Tournefortia,* that a few years ago, during my studies of the Brazilian species of these genera, Contr. Gray Herb. **92:** 1–89 (1930), I was forced to pass over, undiscussed, the very evident relations existing between the species of the Guianas and those of northern Brazil, and forced to admit that certain of the obscure species (several of them not even listed in the Index Kewensis) might be identical and older than the ones I was forced to accept. A careful study of the Guianan Boraginaceae has been long needed.

The conspicuous relationship evident among the Guianan Boraginaceae is that with Brazil, most of the species extending into and about the Amazon Basin or having their immediate relatives there. The affinities westward in Venezuela are not so numerous nor so pronounced. Except for Trinidad (which after all is floristically close to that of eastern Venezuela) direct relations to the northward are negligible. Among the Guianan Boraginaceae only the group *Cordia* § *Pilicordia* has developed any number of local species. The relations of these local endemics are in the Amazon Basin where the species of this group are not local but widely distributed. The Guianas are a marked endemic center for *Pilicordia* comparable with the centers of that group found in southeastern Brazil, northern Venezuela and adjacent Colombia, and the West Indies.

I have treated in this paper all the borages known north and east of the Amazon, the Rio Negro and the eastern boundary of Venezuela. The monotypic *Lepidocordia* is endemic to this area. Of the 38 species definitely known from this large area only two, *Cordia multispicata* and *Cordia naidophila* are at present unknown from British, Dutch or French Guiana. Several other species approach our area, reaching the Orinoco Valley from the westward. Among these species those which may eventually be found in northwestern British Guiana are *Cordia globosa* (Jacq.) HBK., *Cordia alba* Jacq. and *Bourreria cumanensis* (Loefl.) O. E. Schulz. The writings of Schomburgk, Aublet and others have listed various West Indian species from the Guianas. Some of these records are evidently based upon misidentifications, others, however, I am convinced, are simply unfortunate guesses as to what the authors believed might be found there. Most of these questionable records relate to species common and widespread at low altitudes in the Antilles. This group of plants is poorly represented on the Guianan coastal area, probably because of adverse winds and currents and the unfavorably humid conditions.

In the preparation of this report I have examined practically all the types concerned and have studied most of the large or important Guianan collections in Europe and United States. Studies have been made at Kew, London, Leiden, Utrecht, Copenhagen, Berlin, Munich, Geneva and Paris. Large loans of critical material have been obligingly sent for further, more leisurely study at the Arnold Arboretum and the Gray Herbarium from Kew, London, Leiden, Utrecht, Berlin, Paris and New York. Particular mention, however, is to be made of the large loan from the Botanical Museum at Utrecht. This material, assembled through the inspiration of Prof. Pulle and kindly made available to me by him, consists of numerous series of copious specimens collected over a number of years, at different seasons, from various numbered individual trees or shrubs, in the Forest Reserves of Dutch Guiana. Through the examination of this remarkable record of seasonal variation I have been able to establish unquestionably the specific identity of certain seasonal forms heretofore troublesome to identify. Of great help in the preparation of this report the collections have been generally instructive to me personally. It has been a privilege to have such a convincing demonstration of the nature and extent of seasonal variation in individual trees and shrubs of the Tropics.

The following abbreviations have been used in designating the source of the material cited. B. W. — collections by the Forest Service (Boschwezen) of Dutch Guiana; AA — Arnold Arboretum; BD — Botanical Museum at Berlin; BM — British Museum of Natural History; DC — Prodromus Herbarium of DeCandolle at Geneva; Del — Delessert Herbarium at Geneva; G — Gray Herbarium; K — herbarium at Kew; Leid — herbarium at Leiden; NY — New York Botanical Garden; US — U. S. National Herbarium; Utr — Utrecht Herbarium.

KEY TO THE GENERA

Stigmas 2 or 4, simple; inflorescence cymose-paniculate or spicate or globose, the branches not distinctly scorpioid; erect broad-leaved trees and shrubs.

Stigmas 4, capitate or clavate, borne on a conspicuous slender, twice lobed or cleft style ....1. *Cordia*, p. 3.

Stigmas 2, conic, sessile on the apex of the ovary, short and inconspicuous ....2. *Lepidocordia*, p. 45.

Stigma 1, consisting of an anulate fertile base and a more or less developed sterile frequently bifid apical portion; inflorescence with distinctly scorpioid branches or the flowers cauline and solitary in the internodes.

Fruit baccate; clambering shrubs ....3. *Tournefortia*, p. 46.

Fruit dry; herbs or small suffrutescent plants ..4. *Heliotropium*, p. 57.

1. **Cordia** [Plumier] Linnaeus, Gen. 87 (1754).

Trees or shrubs, usually with broad leaves. Inflorescence a loosely paniculate or glomerate or capitate or spicate cyme. Calyx usually 5-toothed or 5–10-lobed, usually persistent. Corolla white, yellow or reddish, small to conspicuous, usually 5-merous, rarely 6–15-merous, salverform or subrotate to funnelform or subtubular. Stamens as many as the corolla-lobes, exserted or included, filaments short or long. Ovary 4-celled, ovules 1–4. Style terminal, well developed, 2-lobed or 2-parted, the branches each 2-lobed. Stigmas 4, capitate or clavate, small. Fruit unlobed, a drupe with a bony pit and mucilaginous or dry exocarp, or the walls dry and papery, 1–4-celled. Endosperm none. Cotyledons plicate.

A very large genus of diverse habit and structures; widely distributed throughout the Tropics. Centering in America. Type Species: *C. sebestena* L.

On the grounds that the original "*Cordia*" of Plumier, Nov. Pl. Amer. Gen. 13, tab. 14 (1703), which was accepted and validated by Linnaeus, is not a member of the Boraginaceae, the generic name *Cordia* has been recently discarded for the present concept by Dr. von Friesen, Bull. Soc. Bot. Genève, sér. 2, **24**: 131–4 (1933). With this I can not agree. It is pointed out by von Friesen that Plumier's illustration shows a 2-celled ovary and a simply bifid style and that the generic description of *Cordia* (based upon Plumier's plate and description) given by Linnaeus in the Genera Plantarum of 1754, pg. 87, also calls for these structures. Dr. von Friesen believes they are structures of some genus outside of the Boraginaceae. I believe they are structures of *Cordia sebestena* faultily described from inaccurate drawings.

I have had the privilege of studying, in the library of the Natural History Museum at Paris, the amazing series of volumes of plates and manuscripts accumulated by Plumier during his visits (1689–97) to the West Indies. In one of these volumes of manuscript, **6**: tab. 64–66, are found fine drawings labeled "*Cordia nucis iuglandis folio, flore purpureo.*" The best of these original drawings, made in the West Indies by Plumier, fills a folio page and shows a characteristic branch of *Cordia sebestena* bearing leaves, flowers and fruit. In the corner of the page are the details of flower and fruit, differing only in arrangement from those printed in Plumier's Genera. The structures of style and ovary are quite alike in both. This may be verified by a comparison of the small plate in Plumier's Genera and the good copy of the original folio plate published in Burmann's edition of Plumier's Plantarum Americanarum, fasc. 5, tab. 105 (1757). The later plate is identified as *C. sebestena* by Urban, Rep. Spec. Nov. Beiheft **5**: 60 (1920). Von Friesen, l. c. 135, however, believes that only the leafy, flower-bearing branch is *C. sebestena* and that the disputed unattached analytic details belong to some other genus. Since, however, the disputed details are an integral part of the original drawing of Plumier, which consists mainly of a flowering and fruiting branch unquestionably of *C. sebestena*, and since the details, as far as one can compare them, are quite like homologous structures shown growing attached to the flowering and fruiting branch of *C. sebestena*, I feel there is every reason for believing that, however inaccurate, they were intended to show the structures of that species.

It is to be recalled that Plumier's drawings were made long before the work of Linnaeus on the Sexual System directed particular attention and gave special importance to the number and structure of the internal parts of the flower and fruit. Plumier, and Linnaeus who copied from him, may have given erroneous descriptions of the fruit and style of *Cordia sebestena* but since they were trying to describe that species I believe we should retain their name for the genus containing it.

Plumier's drawing was made on the island of St. Thomas. The following quotation from his manuscript gives the type-locality of *C. sebestena* in some detail. "Martio plantarum florentem frutusque maturos ferentem adinveni apud insulam Sancti Thomae, juxta Littus quoddam La Baye du nord vocitatum, sinum scilicet ad septenttrionalem plagam ipsi Arci oppositum."

KEY TO THE SPECIES

Corolla marcescent; fruit cylindrical, dry, with a fibrous chartaceous coat, not bony, closely invested by the tube of the persistent corolla and the strongly ribbed cylindrical calyx, at maturity flower disarticulating from the inflorescence and the calyx and corolla and the enclosed fruit falling away together, with the spreading corolla-lobes acting as a parachute; pubescence stellate; axis of inflorescence usually tunnelled or inflated and inhabited by ants ....1. *C. alliodora.*

Corolla withering after anthesis and soon deciduous; fruit usually baccate, with a bony ovoid or globose stone; pubescence simple.

Corolla red or orange, large; calyx becoming fleshy and completely enveloping the dry fruit and even adnate to it ....2. *C. sebestena.*

Corolla white or yellow; fruit juicy, not adnate to the dry calyx.

Corolla-lobes longer than broad; calyx explanate at maturity; inflorescence usually large and loosely branched; trees or shrubs with usually horizontal branches and flat tops.

Petioles of well developed leaves 15–40 (usually 20–30) mm. long; ovary and fruit glabrous; inflorescences terminating leafy branchlets.

Leaves glabrous and lustrous above, 15–40 cm. long; calyx ca. 5 mm. long; stone obliquely ovoid, ca. 18 mm. long; explanate calyx 10–13 mm. broad ....3. *C. fallax.*

Leaves strigose and rather dull above, 10–27 cm. long; calyx 2.5–3.5 mm. long; stone transversely compressed-ovoid, ca. 10 mm. long; explanate calyx 5–7 mm. broad ....4. *C. tetrandra.*

Petioles of well developed leaves 3–15 (usually 5–10) mm. long; inflorescence usually borne at the forks of the dichotomous stems.

Ovary and style hairy; fruit mostly pubescent.

Leaves glabrous above or practically so; veins less conspicuously rebranched than in next; calyx usually apiculate, opening somewhat irregularly.

Stems with conspicuous subnodal swellings that serve as ant-domatia; calyx tending to disintegrate at maturity and showing a fibrous structure; plant usually conspicuously bristly .... 5. *C. nodosa.*

Stems without subnodal swellings, not myrmecophilous; calyx not with fibrous structure; plant not bristly.

Fruit glabrous; calyx with a fine minute strigose-puberulence; lower leaf-surfaces glabrous or practically so .... 6. *C. laevifrons.*

Fruit strigose; calyx strigose; lower leaf-surfaces pubescent.

Lower surfaces of leaves evidently bearing numerous erect slender hairs; inflorescence stiffish but loose and open... 7. *C. Sprucei.*

Lower surfaces of leaves apparently glabrous, but really bearing scattered minute inconspicuous very short ascending hairs; inflorescence dense with short rigid crowded branches .... 8. *C. nervosa.*

Leaves abundantly hairy above, veins repeatedly rebranched; calyx opening by 5 triangular lobes.

Calyx prominently and regularly 10-ribbed, 4–5 mm. long; fruit velvety, stone transversely ovoid .... 9. *C. fulva.*

Calyx not ribbed, 2–4 mm. long.

Upper surface of leaves velvety, with very abundant slender erect or ascending hairs; leaves usually strongly dimorphic about the stem-forks (the normal elongate leaves usually opposed by much smaller suborbicular ones); fruit clothed with abundant slender appressed usually tawny hairs; stone ascending, ovoid .... 10. *C. toqueve.*

Upper surface of leaves simply strigose or minutely scabrous; leaves homomorphic.

Lower surface of leaves green (drying brown), scabrid with very short sparse hairs; leaves lanceolate; fruit minutely strigose; stone ascending ovoid

.... 11. *C. scabrifolia.*

Lower surface of leaves pallid, with a felty covering of abundant appressed slender hairs; leaves broadly lanceolate to ovate; fruit glabrescent; stone transversely ovoid ....12. *C. bicolor.*

Ovary, style, and fruit glabrous.

Lower surface of leaves pallid with a felty covering of abundant slender appressed hairs ......12. *C. bicolor.*

Lower surface of leaves not felty with a pallid indument.

Stone globose or depressed globose, quite rugose; calyx with abundant long slender hairs on the inner surface which project beyond the edge of the calyx-lobes and appear as a dense pale ciliation on their margins.

Calyx outside covered with abundant slender silky hairs; leaves rather thin, more or less dimorphic at the stem-forks, lower surface much paler than the upper ....13. *C. sericicalyx.*

Calyx sparsely strigose outside; leaves rigid, homomorphic, lower surface scarcely paler than upper ....14. *C. panicularis.*

Stone ovoid or ellipsoid, smooth, erect, elongate; calyx strigose on the inner surface, the hairs projecting beyond the calyx-lobes sparse and dark if present.

Hairs on lower leaf-surface erect.

Lower leaf-surface somewhat scabrid with minute stout hairs; leaves large, 15–28 cm. long, with evidently falcate midrib; branchlets with short erect hairs ...15. *C. Sagotii.*

Lower leaf-surface velvety with long slender hairs; leaves moderate-sized, 8–18 cm. long, midrib weakly falcate; branchlets brownish hirsute ....16. *C. hirta.*

Hairs on lower leaf-surface appressed.

Flower-buds elongate, obovoid, 4–5 mm. long; leaves 8–20 cm. long; inflorescence large and stiffish; Lower Amazon and the Guianas.

Leaf-blades broadest at or above middle, drying olivaceous or muddy brown ....17. *C. exaltata.*

Leaf-blades broadest at or below the middle drying a bright warm brown ....17a. var. *melanoneura.*

Flower buds subglobose, 2–3 mm. long; leaves 6–11 cm. long; inflorescence slender and usually small; Upper Amazon ...18. *C. naidophila.*

Corolla-lobes distinctly broader than long; calyx cupulate or cylindrical at maturity; inflorescence dense, globose or spicate, or exceptionally a small loose cyme; shrubs with erect or ascending branches, frequently subscandent.

Corolla very large, 35–50 mm. long, the slender tube abruptly and much expanded into a coarse cylindrical throat; inflorescence capitate; tip of calyx-lobes conspicuously long-attenuate ....19. *C. grandiflora.*

Corolla small, about 5 mm. long or less, tube and throat weakly differentiated.

Inflorescence glomerate or cymose ....20. *C. polycephala.*

Inflorescence distinctly spicate.

Leaves not hairy above, merely more or less verrucose or muriculate, elongate; spikes terminal; petioles not decurrent on the peduncles ....21. *C. macrostachya.*

Leaves hairy above, strigose or velvety, broad; spikes axillary with the base of the petiole apparently decurrent on the subtended peduncle.

Calyx-lobes in bud lacking free tips; inflorescence becoming quite loosely flowered and elongate; upper surface of leaves strigose, somewhat lustrous ....22. *C. Schomburgkii.*

Calyx-lobes in the bud with projecting free tips; inflorescence dense and stout; upper surface of leaves with stiff erect or ascending hairs which arise from bulbous bases, surface not lustrous.

Calyx hairy all over, lobes narrowly triangular, long acuminate ....23. *C. tomentosa.*

Calyx with tube nearly glabrous, lobes broadly triangular, short acuminate .....24. *C. multispicata.*

1. **Cordia alliodora** (R. & P.) Chamisso ex DeCandolle, Prodr. **9:** 472 (1845); Johnston, Contr. Gray Herb. **92:** 13 (1930). *Cerdana alliodora* Ruiz & Pavon, Fl. Peruv. **2:** 47, tab. 184 (1799). *Cordia trichotoma* sensu Sandwith, Kew Bull. **1933:** 335 (1933).

Tree up to 20 m. tall; branchlets sparingly to densely stellate-pubescent; leaves oblong or lanceolate to elliptic, usually broadest at or above the middle, 3–8 cm. broad, 1–2 dm. long, base acute or obtuse, apex acuminate, margin entire, upper surface stellate-pubescent or glabrate, lower surface paler, stellate-tomentose or glabrescent, 5–7 pairs of veins, petiole 1–3 cm. long; inflorescence terminal, loosely and widely branched, 1–3 dm. thick, the flowers crowded on the branches, the axis commonly inflated, gall-like, irregular, usually serving as an ant-domatium; calyx cylindrical, with ten prominent ribs, densely stellate-tomentose, 4–6 mm. long, 2–2.5 mm. thick, lobes 5, inconspicuous; corolla white, drying brown, marcescent, lobes oblong, 5–7 mm. long, 1.5–3.5 mm. broad, spreading; fruit sausage-shaped with fibrous chartaceous wall, ca. 5 mm. long, completely enveloped by the tube of the persistent corolla and by the ensheathing calyx-tube and falling away enclosed by them.

Headwaters of the Rio Branco in northern Brazil and adjacent southern British Guiana; northern Venezuela and Colombia and southward along the Andes and northward in Central America and the West Indies.

BRITISH GUIANA: north side of Kanuku Mts., ca. 10 miles east of the Takutu River, ca. 135 m. alt., small tree, 4.5 m. tall, trunk ca. 8 cm. thick, in secondary forest near edge of savanna, fl. pure white, Oct. 10, 1931, *Forest Dept. Brit. Guiana D230/2221* (K); Pirara (Marakanata), Rupununi Savannas, ca. 120 m. alt., tree ca. 20 m. tall, trunk 11 m. to fork, 4 dm. thick, in sandy soil on patch of savanna-forest on top of ridge, Oct. 21, 1931, *Forest Dept. Brit. Guiana D195/2186* (K).

BRAZIL: Mniam, tributary of Suruma River, Nov. 1909, *Ule 8290* (K, BD, Del); Limão, lower Cotinga River, Sept. 1927, *Tate 140* (NY).

Although previously I have cited one of the above collections as *C. trichotoma*, Contr. Gray Herb. **92**: 15 (1930), I am now of the opinion that all the material from the upper Rio Branco watershed is more closely related to *C. alliodora*. The corolla-lobes in our plants are 3–3.5 mm. broad. The stems are simply tunneled by ants. There are no distorted, gall-like thickenings in the axis of the inflorescence. Compared with large series of *C. trichotoma* and *C. alliodora* our plants seem most like the latter species in gross aspect. The colony on the Rio Branco was probably derived from northern Venezuela where only *C. alliodora* is known. Strangely *C. alliodora* seems to be rare or absent in the Orinoco Valley and in the other parts of the wet tropical forests of northeastern South America.

Previously I have attempted to maintain the Argentine, Paraguayan and Brazilian plant, ranging to the east and south of the Amazon Basin, as a species distinct from *C. alliodora*. I am now of the belief that this plant, called *C. trichotoma* in my treatment of the Brazilian species, is distinguished from *C. alliodora* only by its larger flowers, and that it had best be classified as a variety of that latter species. The correct trinomial for the large-flowered Brazilian form is *Cordia alliodora* var. *tomentosa* A. DC.

2. **Cordia sebestena** Linnaeus, Sp. Pl. 190 (1753). *Cordia speciosa* Salisbury, Prodr. 111 (1796); DeCandolle, Prodr. **9**: 476 (1845); Pulle, Enum. Pl. Surinam 397 (1906).

Tree or shrub 1–7 m. tall; branchlets with a fine soft curly pubescence and scattered much coarser appressed hairs; leaves ovate to elliptic or subcordate, 9–16 cm. long, 5–14 cm. broad, broadest below the middle, base obtuse or rounded or subcordate, apex obtuse to coarsely short-acuminate, margin entire, upper surface with scattered short stiff appressed hairs, the hairs usually arising from minute pustulate disks, lower surface glabrescent or sparsely strigose, with 5–6 pairs of veins; petiole slender, 1–4 cm. long; inflorescence corymbose, usually terminal, ascendingly branched; calyx firm, strigose and densely brown puberulent, elongate in the bud, 12–15 mm. long, 3–5 mm. thick, opening by several unequal teeth ca. 2–3 mm. long, at maturity becoming much expanded by the enlarging fruit which it encloses, 3–4 cm. long; corolla orange or scarlet, funnelform, tube twice length of the cylindrical calyx; fruit bony, dry, ovoid, pointed, 1–2 cm. long, completely and tightly invested by the juicy white accrescent calyx.

Native on the islands of the Caribbean and probably also along the coasts of Venezuela, Colombia and Central America; frequently cultivated in the Tropics.

BRITISH GUIANA: Botanic Gardens, Georgetown, cultivated, Aug. 1905, *collector not given 7976/6915* (BD).

DUTCH GUIANA: Surinam, cultivated, tree 6–9 m., fl. red, Dec. 1837, *Splitgerber 312* (Leid); Cottica district near Plant. Alliance, Aug. 1901, *Went 280* (Utr); Paramaribo, *Focke 1371* (Utr).

FRENCH GUIANA: indefinite, 1802, *Gabriel* (Del).

3. **Cordia fallax,** sp. nov. *Cordia guianensis* Klotzsch ex Schomburgk, Fauna u. Fl. Brit. Guian. 960 (1848), nomen; not *C. gujanensis* (Desv.) R. & S. (1819), nor *C. guianensis* R. & S. ex DC. (1845).

Arbor 5–10 m. alta; ramulis brunnescentibus cum pilis abundantibus brevibus erectis velutinis; foliis homomorphis ellipticis vel obovato-oblongis 15–40 cm. longis 6–18 cm. latis ad medium vel paullo supra medium latioribus minute glanduloso-punctulatis, basi rotundis vel subcordatis ad obtusis vel late acutis, apice breviter acuminatis, margine integerrimis vel rariter leviter sinuatis, supra lucentibus in costa et nervis primariis pilos inconspicuos gerentibus ceteris glabris vel subglabris, subtus pilis plus minusve abundantibus gracillimis ascendentibus molliter vestitis, nervis 7–8-jugatis, costa falcato-curvatis, petiolis 15–30 mm. longis; cymis ramulos foliatos terminantibus laxissime ramosis ad 3 dm. diametro; calyce in alabastro obovoideo extus indumento brunnescente velutino molli vestito, intus glaberrimo, ad anthesin ca. 5 mm. longo (lobis deltoideis 5), fructifero explanato 10–14 mm. lato; corolla 1 cm. longa, lobis obovatis extus glabris, filamentis basim versus pilosis; ovario et stylo glaberrimo; fructu glabro; nuce valde rugoso oblique ovoideo acuminato ca. 18 mm. longo.

Endemic to British Guiana.

BRITISH GUIANA: Issorora, Aruka River, wet forest, tree 9 m. tall, Jan.

1920, *Hitchcock 17563* (TYPE, Gray Herb.; isotype, NY); upper Rupununi River near Dadanawa, ca. lat. 2° 45′ N., tree 5 m. tall, June 10, 1922, *La Cruz 1484* (NY); indefinite, 1844, *Schomburgk 875/1510b* (K); indefinite, 1841, *Schomburgk 875* (BD, Del, P); indefinite, *Schomburgk 1510* (BD, TYPE of *C. guianensis;* G).

Although bearing various numbers and different data, the material from Schomburgk cited above agrees so completely in details of maturity, pressing, etc., that one may recognize it as consisting of parts of a single collection. The material at Berlin bears Klotzsch's binomial. This, however, has never been associated with a description and is further invalid by reason of being a homonym. Schomburgk, l. c., reported *C. guianensis* Kl. only from the banks of the Barama River and there is every reason for believing that this is indeed the source of the Schomburgk material mentioned.

The species has been confused with *C. tetrandra,* although it is readily distinguished from that species by having glabrous upper leaf-surfaces and in being noticeably larger in all its parts. Its relations are with that group of species of Venezuela and Colombia which is exemplified by *C. bogotensis* Benth. Its very large leaves, hairy beneath, quickly distinguish it from these much more westerly species.

4. **Cordia tetrandra** Aublet, Hist. Pl. Guian. Fr. **1**: 222, tab. 87 (1775); Poiret, Encyc. **7**: 42 (1806); Pulle, Enum. Pl. Surinam 397 (1906); Johnston, Contr. Gray Herb. **92**: 55 (1930). *Lithocardium tetrandrum* (Aubl.) Kuntze, Rev. Gen. **2**: 976 (1891). *Cordia cordifolia* Humboldt, Bonpland & Kunth, Nov. Gen. et Sp. **3**: 70 (1818); DeCandolle, Prodr. **9**: 483 (1845). *Lithocardium cordifolium* (HBK.) Kuntze, Rev. Gen. **2**: 976 (1891). *Cordia muneco* Humboldt, Bonpland & Kunth, Nov. Gen. et Sp. **7**: 207 (1825); DeCandolle, Prodr. **9**: 486 (1845). *Lithocardium muneco* (HBK.) Kuntze, Rev. Gen. **2**: 977 (1891). *Borellia asper* Rafinesque, Sylva Tellur. 41 (1838). *Cordia umbraculifera* DeCandolle, Prodr. **9**: 484 (1845); Schomburgk, Fauna u. Fl. Brit. Guian. 960 (1848); Fresenius in Martius, Fl. Bras. 8^1: 16 (1857). *Lithocardium umbraculiferum* (DC.) Kuntze, Rev. Gen. **2**: 977 (1891).

Tree, 3–12 m. tall; branchlets pallid, tomentose with abundant curved spreading short hairs; leaves homomorphic, ovate to elliptic or oblong or lance-ovate, broadest either below or just above the middle (usually the latter), 1–1.7 dm. long, 5–14 cm. broad, base more or less oblique, obtuse or rounded or subcordate, apex obtusish to acute, the very tip blunted (not acuminate), under surface green, sparsely strigose, secondary venation obscure, lower surface much paler, more or less brownish with rather abundant short slender curved hairs which spring from the much rebranched veins, usually velvety, with 7–10 pairs of veins; petioles well developed, 2–5 cm. long; cymes usually terminating leafy branchlets, loosely branched, 1–3 dm. broad; calyx obovoid in bud, densely covered with fine appressed hairs, inside sparsely strigose or hispidulous; calyx at anthesis 2.5–3.5 mm. long, with 4–5 more or less equal deltoid lobes, in fruit explanate and 5–7 mm. broad; corolla white, prevailingly 5-merous, 4–5 mm. long, glabrous, lobes elongate, filaments exserted, hairy at base; ovary and style glabrous; fruit glabrous; stone very rugose, transversely compressed-ovoid, ca. 1 cm. long, pulp white and mucilaginous.

Northeastern coast of Brazil (Maranhão and Pará), northern South America and southward along the Andes to Bolivia; frequently cultivated.

BRITISH GUIANA: Rockstone, banks of the Essequibo, 1921, *Gleason 865* (K); Demerara River, May 1889, *Jenman 4878* (K); Demerara, *Parker* (K, DC); Platburg Creek, Canje River, fruit glutinous, yellowish green, 1914, *Hohenkerk 631* (K); indefinite, large tree, flowers yellowish white, 1837, *Schomburgk 408* (DC, TYPE of *C. umbraculifera;* isotypes, G, K, BD, P).

DUTCH GUIANA: upper Nickerie River, Feb. 1915, *B. W. 1074* (Utr); near Paramaribo, 1910, *native collector* (Utr); near Paramaribo, tree, fl. white, 1844, *Kappler, ed. Hohenacker 1619* (Utr, P); Plant. Jagtlust, 5 m. tall, 1913, *Soeprato 6E* (Utr); Plant. Osembo-Onverwacht, 1913, *B. W. 6229* (Utr); Plant. Slootwijk, tree 5 m. tall, *Soeprato 10H* (Utr); Watramiri, tree no. 1568, fruit edible, mucilaginous, June 4, 1916, *B. W. 1836* (Utr); Watramiri, tree no. 1568, Feb. 7, 1917, *B. W. 2659* (Utr); Watramiri, tree no. 1568, Feb. 18, 1920, *B. W. 4551* (Utr); Watramiri, tree no. 1568, Dec. 7, 1920, *B. W. 4974* (Utr); Surinam, tree 9–12 m. tall with broad horizontal branches, usually cultivated, fl. white, Nov. 1837, *Splitgerber 123* (Leid); Surinam, 1841, *Berthoud-Coulon 553* (BM); Surinam, *Hostmann 355* (K, BM, BD, Del, P); Surinam, *Hostmann* (Utr).

FRENCH GUIANA: Mana, March 1854, *Mélinon 215* (P); Mana, 1857, *Sagot* (P); Iles du Salut, fruit white, glutinous, 1854, *Sagot 445* (K, BM, P); Ile de Cayenne, 1851, *Sagot* (P); Cayenne, *Aublet* (BM, TYPE of *C. tetrandra*); Mahoury near Cayenne, *Sagot* (P); indefinite, *Martin ex herb. Rudge* (BM), *LePrieur 252* (Del, P), *Perrottet* (P), *Gabriel* (Del) and *Poiteau* (K).

Aublet reports *C. tetrandra* from the Ile de Cayenne and from the mainland of French Guiana. I have examined specimens from his personal herbarium, now at the British Museum, as well as a duplicate from it now in the Swartz herbarium at Stockholm. His description, his illustration, and the two specimens, leave no doubt as to the exact identity of *C. tetrandra.* Aublet's name is inapt, the species is practically always pentandrous.

The species appears to be indigeneous only in a broad band of wet tropical forest about the northern margin of South America, where it seems to be most common at low altitudes on the coastal plain. On the east base of the Andes it is known from Peru and Bolivia. I have seen no material from the dryer portions of Brazil to the south of the Amazon Basin that is indubitably from wild plants. Brade, Bol. Mus. Nac. Rio Janeiro **8**: 35 (1932), however, has recently reported it from Manáos. The collections by Spruce from the mouth of the Rio Negro, reported (sub *C. umbraculifera*) in the Flora Brasiliensis, 8¹: 16 (1857), is not *C. tetrandra,* but the material subsequently made the type of *C. Sprucei* Mez. I have reported, Contr. Gray Herb. **92**: 55 (1930), *C. tetrandra* from Ceará and Pernambuco. This was incorrect and is the result of a bad clerical error. The specimens actually represent *C. toqueve.* I am indebted to Mr. Killip, *in lit.*, and to Mr. Brade, l. c. 34, for the correction of this unfortunate error.

The wood of *C. tetrandra* has been described by Pfeiffer, De Houtsoort. v. Surinam. **1**: 444 (1926). In the herbarium at Utrecht the collection, cited above, from the Plantation of Osembo-Onverwacht bears the annotation, "Pfeiffers Woods of Surinam no. 59."

Aublet states that the species is called "Bois Margarite" and "Arbre à parasol." The following vernacular names are associated with the specimens cited above, Kakuru or Clammy Cherry—*Hohenkerk 631;* Kakhoro' (Arow.), Tafrabom (Nig. Eng.) and Alatoeloeka (Kar.)—*B. W. 1074;* Tafelboom—*B. W. 6229* and *Splitgerber 123;* Tafelboom (Sur. Dutch), Tafraboom (Nig. Eng.), Boggi lobbi (Saram.), Toenbalobbi (Saram.), Kakhoro (Arow.), Araatroekoe (Kar.)—*Watramiri tree no. 1568;* Bois parasol—*Sagot 445;* Roqueí—*Sagot at Cayenne and Mahoury.*

5. **Cordia nodosa** Lamarck, Tab. Encyc. **1**: 422 (1791); Poiret, Encyc. **7**: 43 (1806); Schomburgk, Fauna u. Fl. Brit. Guian. 960 1848); Fresenius in Martius, Fl. Bras. **8¹**: 16, tab. 5 (1857); Bailey, Bot. Gaz. **77**: 32–49, tab. 6–7 (1924); Johnston, Contr. Gray Herb. **92**: 46 (1930). *Lithocardium nodosum* (Lam.) Kuntze, Rev. Gen. **2**: 977 (1891). *Cordia hirsuta* Willdenow, Sp. Pl. **1**: 1076 (1798); Meyer, Prim. Fl. Esseq. 114 (1818). *Firensia hirsuta* (Willd.) Rafinesque, Sylva Tellur. 40 (1838). *Cordia formicarum* Hoffmannsegg ex Roemer & Schultes, Syst. **4**: 800 (1819). *Cordia miranda* DeCandolle, Prodr. **9**: 475 (1845). *Lithocardium mirandum* (DC.) Kuntze, Rev. Gen. **2**: 977 (1891). *Cordia hispidissima* DeCandolle, Prodr. **9**: 475 (1845). *Lithocardium hispidissimum* (DC.) Kuntze, Rev. Gen. **2**: 977 (1891). *Cordia nodosa* var. *hispidissima* (DC.) Fresenius in

Martius, Fl. Bras. **8**^{1}**:** 17 (1857). *Cordia nodosa* var. *angustifolia* Fresenius in Martius, Fl. Bras. **8**^{1}**:** 17 (1857). *Cordia umbrosa* Spruce ex Rusby, Bull. Torr. Bot. Cl. **26:** 147 (1899). *Cordia volubilis* Pittier, (Explor. Bot. Cuenca de Maracaibo p. 41) Bol. Comer. e Indust. **4:** ? (1923); Jour. Wash. Acad. Sci. **19:** 184 (1929). *Cordia collococa* sensu Aublet, Hist. Pl. Guian. Fr. **1:** 219, tab. 86 (1775).

Shrub or tree, 2–11 m. tall; stems bearing stiff spreading brownish bristles which are usually abundant but may be sparse or nearly absent; the stems below each fork abruptly and asymmetrically enlarged and containing a cavity usually serving as an ant-domatium; leaves usually subopposite or whorled, more or less heteromorphic, somewhat lustrous on both surfaces, lanceolate to nearly elliptic, broadest near the middle, 10–35 cm. long, 3–28 cm. broad, base obtuse, apex acuminate, margin entire, upper surface with impressed veins, more or less bullate, with a few hairs along the midrib, lower surface paler, with very scattered bristles on the veins, with 6–10 pairs of veins, these repeatedly rebranched and anastomosing, petiole 2–5 mm. long, bristly; inflorescence cymose-paniculate, loose or dense, 2–10 cm. in diameter, bristly and usually also with minute curly brownish pubescence, borne at the forks of the stem; calyx usually somewhat puberulent and strigose, more or less bristly especially about the apiculate apex, papery in texture and very obscurely ribbed, opening irregularly to form several very irregular lobes, frequently persisting and eventually breaking up into fibers; calyx in the bud ovoid or ellipsoid, ca. 5 mm. long; corolla white, tube 4–6 mm. long, lobes 2–3 mm. long, filaments hairy at base, 3–4 mm. long; style and ovary hairy; fruit usually more or less bristly; stone transversely ovoid, 13–17 mm. long.

In British, Dutch and French Guiana and widely distributed in the Amazon Basin; also in the headwaters of the Orinoco (in southern Venezuela and eastern Colombia) and in northwestern Venezuela.

BRITISH GUIANA: Amakura River, 5 m. tall, March 1923, *La Cruz 3430* (G); Barima River, March 1896, *Jenman 7055* (K); Kamakusa, upper Mazaruni, ca. long. 59° 50′, 1922–23, *La Cruz 2887* and *4231* (G); Macouria River, Nov. 1886, *Jenman 2391* and *2392* (K); Tumatumari, dense upland forest, shrub 2.5–6 m. tall, 1921, *Gleason 311* (K); Kaieteur Falls, Potaro River, 1923, *La Cruz 4407* (G); island in Cuyuni River below Kamaria Falls, 18 dm. tall, 1920, *Bailey 40* (G); Kartabo region, second growth forests, 1920, *Bailey 29, 41* and *42* (G); Bonasika Creek, at sea-level, *Anderson 66* (K); Moraballi Creek, small tree up to 6 m. tall, in low brush and clearings in mixed forest, fl. white, fruit bristly, becoming pale red, Aug. 15, 1929, *Sandwith 12* (K, BD); Rockstone, dense upland forest, 2.5–3 m. tall, 1921, *Gleason 583* (K); Blue Mts., Demerara, fruit red, hairy, sweet and clammy, an expectorant, *Parker 272* (K); Demerara

River, May 1889, *Jenman 4924* (K); Malaroo Creek, Corantyne River, small tree, 3–6 m. tall, Oct. 1879, *im Thurn* (K, P); indefinite, *Schomburgk 904* (K) and *984* (K, BM, BD, P).

DUTCH GUIANA: Kaboeri Reserve, Corantyne River, tree no. 684, Nov. 1920 and Aug. 1922, *B. W. 4835* and *5986* (Utr); mouth of Lucie River, Corantyne River, 1910, *Hulk 315* (Utr); way to Kwatta, Paramaribo, June 1916, *Samuels 237* (G, Leid, BD, P); Station at Groningen, forest, May 1916, *Samuels 123* (G, K, Leid, BD, P); Watramiri reserve, Saramacca River, June 1918, *B. W. 3864* (Utr); Watramiri reserve, tree no. 1652, mature fruit yellow, soft and sweet, Dec. 1916, *B. W. 2488* (Utr); Watramiri, tree no. 1652, used for tea, May, 1916, *B. W. 1911* (Utr); Watramiri reserve, tree no. 1652, April 1917, Oct. 1917, July 1918, and Feb. 1920, *B. W. nos. 2756, 3309, 3872* and *4541* (Utr); Watramiri reserve, tree no. 1652, fl. white, *B. W. 4012* (Utr); Watramiri reserve, tree no. 1652, March 1919, ripe fruit sordid white, *B. W. 4301* (Utr); Sectie O. reserve, upper Para River, tree no. 800, fl. light green, leaves used for tea, Aug. 1916, *B. W. 2306* (Utr); woods near Poelebantji, tree 4–6 m. tall, Feb. 1845, *Kegel 691* (Utr); Brownsberg, Surinam River, tree 10 m. tall, trunk 1 dm. thick, fl. sordid white, Sept. 1915, *B. W. 727* (Utr); Brownsberg reserve, tree no. 1174, fl. white, dried leaves used as a substitute for tea, fruit yellow, globose, soft and juicy, Nov. 1916, *B. W. 2498* (Utr); Brownsberg reserve, tree no. 1174, fl. white, Sept. 1918, *B. W. 4002* (Utr); Brownsberg reserve, tree no. 1174, March 1917, Feb. 1919 and March 1921, *B. W. nos. 2721, 4265* and *5075* (Utr); Brownsberg reserve, tree no. 1174, fl. sordid white, with strong odor, Sept. 1923, *B. W. 6227* (Utr); Brownsberg reserve, tree no. 1174, fl. sordid white, odor strong, Nov. 1924, *B. W. 6684* (Utr); Brownsberg summit, July 1924, fl. white, *B. W. nos. 6634* and *6722* (Utr); woods near Raleigh Falls, Coppename River, hispid tree, fl. yellowish white, fruit white, hispid, Sept. 11, 1933, *Lanjouw 788* (Utr).

FRENCH GUIANA: Maroni, 1864, *Mélinon* (G, Del, P); Ile Portal, Maroni River, *Sagot* (P); Ile Portal, fruit white, soft, size of a grape, June 1857, *Sagot 446* (P); Acarouani, tree, corolla pale yellowish, sepals 4, stamens 4, Oct. 1854, *Sagot 446* (P); Acarouani, 1854, *Sagot* (P); Acarouani, fruit red, April 1858, *Sagot 446* (P); Acarouani, 1859, *Sagot* (P); Acarouani, fruit pale yellow, 1854, *Sagot 446* (P); Godebert, *Wachenheim 410* (P); in loco Macaya ad praedicem Patuis, *Richard* (P) vicinity of Cayenne, hill above Grant's Road, Montabo, shrub, 1921, *Broadway 543* (G, K); Cayenne, *Martin* (BM, BD, P); Cayenne, March 1859, *Sagot* (P); Cayenne, *Patris* (BM, Del); indefinite, 1850, *Leprieur* (BM, P); indefinite, *Aublet* (BM, TYPE of *C. nodosa*); indefinite, *Perrottet 214* (Del, DC) and *Poiteau* (K, BD, P).

BRAZIL: Carmo, Rio Branco, Sept. 1, 1924, *Bequaert* (G); Surumu, Serra do Mairary, Rio Branco, tree or shrub 2–8 m. tall, fl. white, Nov. 1909, *Ule 8456* (K, BD); Rio Negro below mouth of Xibarú, betw. Barcellos and São Gabriel, Dec. 1854 *Spruce 3790* (NY, K, Del); Rio Cuminá, *Sampaio 5136* and *5148* (BD); near Montalegre, Nov. 24, 1873, *Traill 561* (K); Prainha, Dec. 17, 1873, *Traill 562* (K).

VENEZUELA: Casiquiari, in shade along streams, fl. white, tree 6 m. tall, Jan. 1853, *Spruce 3281* (G).

This is a classic ant-plant. The results of an anatomical study and a review of the more important literature on this plant have been published recently by I. W. Bailey, Bot. Gaz. **77**: 32–49, tab. 6–7 (1924). According to this author the peculiar subnodal structures serving as ant-domatia are "formed by an invagination of epidermal, cortical, and fibrovascular tissues which originate in the axil of one of the leaves of the false verticil, and which develops into the interior of a more or less symmetrical or unilateral, subnodal enlargement of the cauline axis."

The attention drawn by the complex ant-domatia has, I believe, blinded students to the evident relationships of this remarkable plant. The flowers and fruit are very similar to those found in *C. Sprucei* and its relatives. The apiculate, papery, irregularly disrupted calyx, the hairy ovary and style, and the transversely ovoid stone, not to mention the glabrous upper leaf-surfaces, comparatively stiff and contracted inflorescence, etc., all indicate close relations with that group of upper Amazon and Guianan species. *Cordia nodosa* has only three notable peculiarities, its subnodal swellings, its bristly indument, and its fibrous calyx. In the past the species has been placed in a special section, *Physoclada,* of the genus *Cordia.* I have become so impressed with its obvious relations with *C. Sprucei* and allies, however, that I now am quite content to associate it with these species in the section *Pilicordia.*

The species is very variable both in the size and shape of its leaves, and in the abundance of the bristles on its herbage. This variation seems to be ecological in origin. In any case I can find no evidence that it is in any way geographically correlated. It should be noted that collectors have given the fruit in British Guiana as red. In Dutch and French Guiana the fruit is given as white or whitish in numerous cases, and once as yellow.

Aublet gives the Carib name for the plant as "Achira-mourou." The following vernacular names are associated with specimens cited: Courabelli ants plant—*Anderson 66;* Ylūrĭ-hee-lĕvĭ-koŭ—*Parker 272;* Hurneyreyroko—*Sandwith 12;* Awelemoeloe (Kar.)—*B. W. 727;* Marribonsoehoedoe (Neg. Eng.), Horowejorereroko (Arow.), Arreuonoe (Kar.)—*Tree no. 1652 at Watramiri;* Mattoe toenbalobbi (Sar.), Horowé, joee lokko, Hoereuerereroko (Arow.), and Awali emoeloe, Aloeko uonoré (Kar.)—*Tree 800 at Sectie O.*

6. **Cordia laevifrons,** sp. nov.

Arbor minor vel frutex, dichotome ramosus; ramulis fuscis, apicem versus dense puberulis mox glabrescentibus; foliis vix crassis ellipticis

ad lanceolato-oblongis vel oblongo-obovatis 12–25 cm. longis 6–14 cm. latis saepe ad medium vel supra medium latioribus, basi obtusis vel plus minusve rotundis vel late acutis, apice saepe abrupte acuminatis, supra lucentibus saepe in costa pilos paucos adpressos gerentibus ceteris glaberrimis, subtus pallidioribus glabris vel sparsissime minutissimeque ascendenter adpresseque pubescentibus, nervis primariis 6–8-jugatis, nervis tertiariis obscuris, petiolis 5–18 mm. longis; cymis saepissime in furcis ramulorum ortis, laxe graciliterque ramosis 3–15 cm. diametro, pedunculo gracili; corolla alba glabra, tubo 6 mm. longo calycem superante, lobis 2 mm. longis rotundis latis, filamentis 4 mm. longis longe exsertis basim versus pilosis; calyce in alabastro anguste obovato 4–5 mm. longo extus dense puberulento (intus subglabro) obscure lateque 10-costato, apice plus minusve apiculato ad anthesin in lobos irregulares lacerulatos disrupto, fructifero explanato; stylo et apice ovarii sparse minuteque hispidulo; fructu glaberrimo; nuce transverse ovoideo 10–14 mm. longo.

Endemic to French and Dutch Guiana.

DUTCH GUIANA: Lucie River, a small tree 6 m. tall, fl. white, April 12, 1926, *B. W. 6999* (Utr); forest near Abontjeman, May 1910, *native collector 236* (TYPE, Utrecht).

FRENCH GUIANA: Maroni River, 130 km. upstream, fruit edible, 1877, *Crevaux* (P); along the Maroni, 1861, *Mélinon 16, 59, 254* and *271* (P); along the Maroni, 1863, *Mélinon 283* (P); Maroni, along road to St. Laurent, clearings, 15 dm. tall, fl. white, Oct. 1876, *Mélinon 225* (P); St. Jean, 2 m. tall, fl. white, May 16, 1914, *Benoist 1230* (P).

A relative of *C. Sprucei* notable chiefly for its rather thin, nearly glabrous leaves, puberulent obscurely ribbed calyces, and quite glabrous fruits. As with other relatives of *C. Sprucei* the veins of the leaves are not so finely rebranched as is common in this section of the genus. Crevaux gives the bush-negro name of the plant as "Tiki Topichi."

7. **Cordia Sprucei** Mez, Bot. Jahrb. **12:** 549 (1890); Johnston, Contr. Gray Herb. **92:** 53 (1930). *Lithocardium Sprucei* (Mez) Kuntze, Rev. Gen. **2:** 977 (1891).

Tree 4–5 m. tall, branching dichotomous; branchlets dark, sparsely short-hirsute or with short incurved hairs; leaves drying brown, subhomomorphic, elliptic or oblong-obovate, 12–23 cm. long, 6–11.5 cm. broad, broadest at or above the middle, apex acuminate, base acute to truncate, upper surface somewhat lustrous, hairy along the midrib and with scattered hairs along the principal veins but otherwise glabrous, lower surface with rather abundant short soft erect hairs, petiole 5–10 mm. long, veins in 6–9 pairs, tertiary veins tending to be obscure; in-

florescence rather loosely though rigidly branched, ca. 1 dm. thick, usually borne at the forks of the stem, rarely terminal; calyx well covered with short incurving tawny hairs, obscurely ribbed, obovate in the bud and apiculate, 4–5 mm. long, ca. 2.5 mm. thick, bursting rather irregularly at the apex into 2–5 broad rather thin teeth; corolla white, tube 4–5 mm. long, lobes broad ca. 1.5 mm. long, filaments hairy at base, 4 mm. long; ovary densely hairy above the middle; fruit yellow, strigose; stone transversely ellipsoid, 1–1.5 cm. long.

Known only from the Rio Negro of Brazil and from French Guiana.

FRENCH GUIANA: "in Sylvis doeciduis Fluvii Kourou, ad casam indi Felix," Nov., *Richard* (P).

BRAZIL: Barra do Rio Negro, 1850–51, *Spruce 1019* (Munich, TYPE; BD, frag; G, photo.); vicinity of Barra, 1850–51, *Spruce* (G, K, BM); Barra to Matiriho, Jan. 1851, *Spruce 1234* (K, BM); Barra, fruit yellow, transversely oblong, April 1851, *Spruce 1234* (K, BM, Del); São Gabriel, Rio Negro, ca. 90 m. alt., 1930–31, *Holt & Blake 608* (G).

Richard's label gives the following field data concerning his collection from French Guiana,—"frutex 3–4 ped., ramis diffuse patentibus, dichotomis; fl. albidi; ramillis cymae recurvis et, inexpansis floribus, revolutis." The collections are remarkably similar to Spruce's material from the lower Rio Negro, except that in one of Richard's two sheets the branches of the inflorescence are somewhat tawny tomentulose.

Since discussing the type of *C. Sprucei*, l. c., I have examined the actual type-specimen at Munich. The specimen has the following familiar printed label reading, "In vicinibus Barra, Prov. Rio Negro, coll. R. Spruce, Dec.-March, 1850–51." The collector's number, in script, is "1019." The specimen is that cited under *C. umbraculifera* in the Flora Brasiliensis. It is evidently part of the same collection as the unnumbered specimens I have seen at the Gray Herbarium, at Kew, and at the British Museum.

This species not only has relatives in *C. nervosa* and *C. laevifrons* of the Guianas but also in undescribed trees of the Putumayo and the Huallaga of eastern Peru. The glabrous upper leaf-surfaces and the somewhat papery irregularly disrupted apiculate calyces are characters of this group of species.

8. **Cordia nervosa** Lamarck, Tab. Encyc. **1**: 422 (1791); Poiret, Encyc. **7**: 47 (1806); DeCandolle, Prodr. **9**: 484 (1845). *Lithocardium nervosum* (Lam.) Kuntze, Rev. Gen. **2**: 977 (1891). *Cordia calophylla* Vahl, Ecolog. **3**: 5 (1807); DeCandolle, Prodr. **9**: 486 (1845). *Lithocardium calophyllum* (Vahl) Kuntze, Rev. Gen. **2**: 976 (1891).

Shrub or small tree, up to 5 m. tall; branchlets closely and antrorsely strigose; leaves homomorphic, stiff and coriaceous, with an arcuate midrib, broadly lanceolate to elliptic or lance-oblong, 10–25 cm. long, 4–10 cm. broad, margin weakly recurved, apex acuminate, base rounded to acute and usually more or less oblique and asymmetrical, upper surface glossy, smooth and quite glabrous, lower surface drying brown, dull, somewhat scabrous with abundant short inconspicuous hairs, with 8–10 pairs of primary veins, these connected by simple branches, the secondary branches of the veins absent or very obscure; petiole canaliculate, stiff, 5–10 mm. long; inflorescence small and compact, 1–4 cm. long, peduncles very short or none, branches slender, strictly forked, bearing flowers on only one side and in age studded with the elevated pedicellar flower-attachments, becoming rigid and woody in age and more or less spreading or deflexed, persistent long after the falling of the fruit; calyx obovoid in bud, 4–5 mm. long, minutely short-strigose, more or less apiculate, not at all ribbed, sparsely strigose inside, bursting apically and the lobes torn and irregular, in fruit explanate; corolla white, tube ca. 5 mm. long, lobes broad, ca. 3 mm. long, filaments very hairy; ovary glabrous or sparsely hairy towards the apex; style usually sparsely hairy; fruit minutely and abundantly strigose, pulp bright red, glutinous, insipid; stone transversely ovoid, 10–13 mm. long.

French Guiana and adjacent Brazil; British Guiana.

BRITISH GUIANA: Kaieteur Savanna, spreading shrub 18 dm. tall, 1881, *Jenman 1062* (K).

FRENCH GUIANA: Cayenne, 1857, *Mélinon* (P); Gourdonville, Kourou River, shrub, fl. white, Sept. 25, 1914, *Benoist 1618* (P); in umbrosis sylvis praedii Dm. [?] Patuis, *Richard* (P); indefinite, *herb. Lamarck* (Paris, TYPE of *C. nervosa*); indefinite, *von Rohr 152* (herb. Vahl, TYPE of *C. calophylla*; BM, isotype); indefinite, 1859, *Leprieur* (Del); indefinite, 1819–21, *Poiteau* (K, Del).

BRAZIL: Counany, Oct. 13, 1895, "Chapeo del Sol," *Huber 1032* (Boiss).

The type of *C. nervosa* in the Lamarck herbarium is so very similar to the material collected by Richard (in the General Herbarium at Paris) that I believe they are parts of a single collection or, in other words, that the type of *C. nervosa* was collected by Richard. Unfortunately, I have been unable to identify Richard's locality with any degree of confidence. At Paris I found on the label of a very different species the following more explicit mention of the probable locality, i. e. "in loco Dm. [spelling?] Macaya ad praedicem Dm. [?] Patuis." There was formerly a sugar plantation called Macaya on the Ile de Cayenne several kilometers east of Matoury. This may have been that referred to by Richard, for he is known to have collected extensively about the Island of Cayenne as well as over most of the French Guianan coastal region.

It is interesting to note that Richard has appended to his specimen a manuscript name, under *Collococcus*, in which the same specific epithet is used as was subsequently published by Vahl. Richard and von Rohr were both in the Guianas about 1785. These facts naturally make one wonder if there may not have been some meeting or some exchange of material between these two botanists and possibly if Vahl's type may not have had the same source as that of Lamarck.

The species is an unusually distinct one, being notable because of its suppressed tertiary leaf-veins and small dense subsessile inflorescence. Its closest relations are with *C. Sprucei* and *C. laevifrons* which have similar somewhat papery, irregularly dehiscent apiculate calyces. In *C. Sprucei* the veins are more repeatedly branched than in *C. nervosa,* though generally less so than in other species of the section *Pilicordia.*

9. **Cordia fulva**, sp. nov.

Arbor vel frutex, dichotome ramosus; ramulis brunneis cum pilis brevibus divergentibus abundantissimis velutinis; foliis subhomomorphis crassiusculis ellipticis vel ovatis 10–22 cm. longis 7–11 cm. latis saepe ad medium vel supra medium latioribus, basi obtusis vel rotundis vel rariter acutis, apice breviter acuminatis, supra scabris pilis brevibus rigidusculis ascendentibus vestitis, subtus saepe brunnescentibus velutinis in nervis et nervulis elevatis et numerosis pilos graciles erectos abundantes gerentibus, nervis 5–7-jugatis, petiolis brevibus; cymis in furcis ramulorum ortis vel rariter terminalibus, rigidis brunneo-velutinis laxe ramosis, floribus in ramulis plus minusve congestis; calyce in alabastro obovato 4–5 mm. longo 2–3 mm. crasso evidenter 10-costato extus brunneo-velutino intus supra medium strigoso; lobis 5 deltoideis; corolla alba, tubo 5 mm. longo, lobis ca. 2.5 mm. longis et latis, filamentis 4–5 mm. longis basim versus pilosis; ovario apicem versus dense longeque pilosis; fructu evidenter velutino; nuce transverse ovoideo 1–1.5 cm. longo.

Known only from northern Dutch Guiana and adjacent French Guiana.

DUTCH GUIANA: near Abontjeman, in forest, May 1910, *native collector 227* (Utr); near Gold Placers, April 14, 1910, *native collector 103* (Utr).

FRENCH GUIANA: Maroni, shrub 3 m. tall, in clearings, fl. white, branches horizontal, 1877, *Mélinon 137* (TYPE, Gray Herb.; isotype, Paris); Maroni, *Mélinon 455* (G, P); Maroni, *Wachenheim 75* (G, P); indefinite, 1862, *Mélinon 82* (P); indefinite, 1821, *Perrottet* (P).

Related to *C. trichoclada* DC. and *C. Chamissoniana* Don, of eastern Brazil, this species differs from the former in its velvety rather than bristly stems, more softly hairy scarcely bullate leaves, looser less stiffly branched larger inflorescences and slightly smaller calyces, and from *C. Chamissoniana* in its more hairy leaves and conspicuously ribbed, more tawny calyces.

10. **Cordia toqueve** Aublet, Hist. Pl. Guian. Fr. **1**: 228, tab. 90 (1775); Poiret, Encyc. **7**: 44 (1806); DeCandolle, Prodr. **9**: 488 (1845); Johnston, Contr. Gray Herb. **92**: 52 (1930). *Lithocardium toqueve* (Aubl.) Kuntze, Rev. Gen. **2**: 977 (1891). *Cordia heterophylla* Poiret, Dict. Sci. Nat. **10**: 409 (1818); Willdenow ex Roemer & Schultes, Syst. **4**: 800 (1819); Chamisso, Linnaea **4**: 480 (1829); DeCandolle, Prodr. **9**: 487 (1845). *Lithocardium heterophyllum* (Poir.) Kuntze, Rev. Gen. **2**: 977 (1891). *Cordia pubescens* Willdenow ex Roemer & Schultes, Syst. **4**: 800 (1819). *Lithocardium pubescens* (Willd.) Kuntze, Rev. Gen. **2**: 977 (1891). *Toquera tomentosa* Rafinesque, Sylva Tellur. 40 (1838). *Cordia hebecarpa* DeCandolle, Prodr. **9**: 488 (1845). *Lithocardium hebecarpum* (DC.) Kuntze, Rev. Gen. **2**: 977 (1891).

Tree; branchlets velvety with abundant soft more or less curled brown hairs; leaves strongly dimorphic, upper surface with rather abundant short straight ascending hairs, lower surface velvety with curved soft slender spreading hairs from the prominent and numerous veins and veinlets; larger principal leaves very broadly lanceolate to lance-ovate, broadest towards the base, 1–3 dm. long, 6–15 cm. broad, above the middle contracted to an acute or acuminate apex, base obtuse to rounded, somewhat oblique; smaller sort of leaves more or less orbicular, 5–12 cm. long, 5–11 cm. broad, broadly obtuse or even subcordate at base, rounded or acuminate at apex; inflorescence loosely and slenderly branched, 1–1.5 dm. broad; calyx obovoid in bud, 2.5–3 mm. long, opening by 5 triangular lobes, unribbed, strigose inside, outside covered with a dense indument of appressed slender curved hairs; calyx becoming somewhat cupulate at maturity, ca. 1.5 mm. deep; corolla white, tube 2.5 mm. long, lobes 1.5 mm. long, filaments 2 mm. long, hairy near base; ovary densely hairy at apex; fruit abundantly tawny-strigose, style-base forming a short eccentric beak; stone ovoid, strictly ascending, ca. 1 cm. long.

Confined to French Guiana and eastern Brazil.

French Guiana: vicinity of Cayenne, small tree, fruit yellowish, May 16, 1921, *Broadway 201* (G); near Cayenne, fl. yellow, 1897, *Soubiron* (P); near Cayenne, July 1841, *Mélinon 243* (Leid, P); Cayenne, Feb. 1859, *Sagot* (P); Cayenne, *Martin* (K); Cayenne, *Leblond, ex Mus. Paris 348* (BD, P); Cayenne, *ex Mus. Paris sine no.* (G, BD); Cayenne, *Herb. Willd. sub no. 4574* (BD, TYPE of *C. heterophylla* Willd.); Cayenne, *Herb. Poiret* (P, TYPE of *C. heterophylla* Poir.); indefinite, *Aublet* (BM, TYPE of *C. toqueve*); indefinite, *Poiteau* (K); indefinite, 1859, *Leprieur* (Del).

The original material of this species was collected by Aublet in clearings made by the Caribs about 15 leagues up the Sinnamary River. The tree was called "Toquévé" by these inhabitants of French Guiana. I have seen Aublet's specimen at the British Museum. This material, taken in conjunction with Aublet's illustration and lengthy description, leaves no doubt as to the correctness of the present application of the name.

At Paris among Poiret's specimens (in the Cosson collections) there is a fragmentary specimen of the present species accompanied by a label in Poiret's script reading, *Cordia heterophylla,* folia altera majora et minora, rami asperi, hirti. Caienne. Added to the label in another, and unrecognized hand is "dict. des Sc. nat. herb. Poiret." Poiret stated that *Cordia heterophylla* was seen in the Desfontaines herbarium. The specimen in the Poiret collections at Paris is, I believe, a fragment of the type of *C. heterophylla* Poir., now probably conserved at Florence.

The binomial *"C. heterophylla"* is found on a specimen of *C. toqueve* in Willdenow's herbarium at Berlin and was published by Roemer & Schultes a year after Poiret's published use of the name. The specimen is also given as from "Cayenne" and may be a duplicate of the specimen described by Poiret.

Cordia toqueve is readily distinguished among the South American species by its tawny velvety indument, strikingly dimorphic leaves, and conspicuously hairy fruit. It is known only from Bahia, Ceará and Pernambuco in Brazil, and from near Cayenne in French Guiana. The Brazilian plant, which is quite like that from the Guianas, has been described as *C. hebecarpa* DC.

11. **Cordia scabrifolia** A. DeCandolle, Prodr. **9:** 485 (1845); Johnston, Contr. Gray Herb. **92:** 53 (1930); Brade, Bol. Mus. Nac. Rio Janeiro **8:** 34 (1932).

Tree or shrub up to 15 m. tall, branching dichotomous; branchlets dark, abundantly and minutely antrorse-strigose; leaves homomorphic, ovate- to oblong-lanceolate, 11–18 cm. long, 4–7 cm. broad, broadest near the middle, apex acuminate, base acute to somewhat rounded; upper surface drying dark, abundantly and very minutely antrorse-strigose, lower surface drying light, bearing numerous very minute very short appressed hairs on the abundant veins and veinlets, the hairs tending to be directed centripetally towards the middle of the veinlet-areoles, petiole 4–9 mm. long, veins in 5–8 pairs, repeatedly rebranched; inflorescence usually borne at the forks of the stems, pedunculate, slender, loosely branched, 4–10 cm. broad; calyx obovoid in the bud, ca. 3 mm. long, densely strigose, opening by 5 subequal triangular lobes, strigose inside, base substipitate; corolla white, tube ca. 3 mm. long, lobes ovate, ca. 2 mm. long, filaments exserted, hairy at base; style and at least the apex of the ovary hairy; fruit densely and minutely strigose; stone ovoid, ascending, ca. 1 cm. long.

Probably restricted to the Amazon Basin; doubtfully reported from British Guiana.

BRITISH GUIANA: indefinite, *Schomburgk 911* (Boiss, TYPE; isotypes, K, BM, BD, P).

BRAZIL: Prainha, Nov. 1873, *Traill 563* (K); Rio Cuminá, Oct.-Nov. 1928, *Sampaio 5367, 5505* and *5510* (BD); Rio Negro-gapó above Cabuquena, Dec. 1851, *Spruce 1942* (K, BM).

Except for the type-collection, *Schomburgk 911,* which is given as from British Guiana, all known collections of *C. scabrifolia* come only from within the Amazon Basin. I suspect that the type also came from the Amazon watershed and from what is now Brazil. Schomburgk, Fauna u. Fl. Brit. Guiana 960 (1848), reports the species from the upper Essequibo. It is significant, however, that no other collectors have found it in British Guiana and that, in the notes of Robert Schomburgk, plant no. 911, which certainly seems to apply to this species, refers to a collection almost certainly from the Rio Negro watershed. In the list no. 911 has no locality indicated but the adjacent numbers, where the locality is indicated in several instances, all do come from Barcellos on the Rio Negro.

12. **Cordia bicolor** A. DeCandolle, Prodr. **9**: 485 (1845); Pulle, Enum. Pl. Surinam 397 (1906). *Lithocardium bicolor* (A. DC.) Kuntze, Rev. Gen. **2**: 976 (1891). *Cordia dichotoma* Klotzsch ex Schomburgk, Fauna u. Fl. Brit. Guiana 1084 (1848), nomen; not Forst. (1797). *Lithocardium Lockartii* Kuntze, Rev. Gen. **2**: 438 (1891). *Cordia Lockartii* Kuntze, Rev. Gen. **2**: 438 (1891), in synonymy. *Cordia trichostyla* Pittier, Contr. U. S. Nat. Herb. **18**: 252, fig. 102 (1920). *Cordia carnosa* Rusby, Three Hundred N. Sp. So. Amer. Pl. 104 (1920). *Cordia coriacea* Killip, Jour. Wash. Acad. Sci. **17**: 329 (1927). *Cordia sericicalyx* sensu Johnston, Contr. Gray Herb. **92**: 54 (1930).

Shrub or small tree up to 6 m. tall, branching dichotomous; branchlets angulate, velvety with very abundant spreading usually tawny short hairs; leaves homomorphic, ovate to more or less broadly lanceolate, broadest at or below the middle, 8–16 cm. long, 2.5–7 cm. broad, apex acuminate, base acute to rounded, upper surface dark, finely strigose, lower surface very pale, covered by appressed slender hairs that are borne on the veins and veinlets and which converge over and cover the veinlet-areoles; veins in 5–7 pairs, repeatedly rebranched; petiole 5–10 mm. long; inflorescence usually at the forks of the stem, loosely branched; calyx in bud ca. 4 mm. long, obovoid, clothed with abundant short appressed more or less tawny hairs, inner surface with numerous appressed longer white hairs, opening by 5 subequal triangular lobes; corolla white, tube ca. 3 mm. long, lobes ca. 2.5 mm. long, filaments hairy near base; style and upper part of ovary hairy or these exceptionally glabrous; fruit glabrescent; stone transversely ovoid, over 1 cm. long.

Occurring in the Amazon headwaters of Bolivia; east and south of the Amazon Basin in Brazil; and across northern South America from Dutch Guiana to eastern Colombia; apparently very sporadic in occurrence, widely distributed but not common. Also in Central America and in the southern-most West Indies.

BRITISH GUIANA: Oreala, Corantyne River, Oct. 1879, *Jenman 7* (K); indefinite, *Schomburgk "109"* (K); indefinite, *Schomburgk 601* (BM).

DUTCH GUIANA: indefinite, *Hostmann 406* (DC, TYPE of *C. bicolor*; isotypes, K, BD, Del, P); indefinite, *Hostmann & Kappler 406* (Munich); indefinite, *Kappler 406* (P).

BRAZIL: Roraima, 1200 m. alt., corolla white, Feb. 1910, *Ule 8748* (K, BD); Roraima, 1842–43, *Schomburgk 678* (Del, P); indefinite, *Schomburgk 678/1032* (K); indefinite, Nov. 1842, *Schomburgk 1032* (BD, TYPE of *C. dichotoma*).

VENEZUELA: Lower Orinoco, 1896, *Rusby & Squires 418* (NY, TYPE of *C. carnosa*).

In my paper on the Brazilian cordias I quite incorrectly applied the name *C. sericicalyx* to this present species. The type of *C. sericicalyx* is *Schomburgk 109*. There is material of *C. bicolor* at Kew and the British Museum, however, which bears Schomburgk's no. 109. Mr. Killip has suggested to me that this may have resulted from inverting no. 601. Reexamination of the specimens makes me believe this suggestion is correct, especially since one finds in Robert Schomburgk's notes (for nos. 589–700 incl.), which were forwarded from Curasscuraka (on the Rupununi at the base of the Annai Hills) on Feb. 1838, that no. 601 bears the following appropriate data, "a shrub with brown bark growing like the table tree, leaves green, below silvery, calyx light green, petals white, filaments and anthers cream-colored." No locality for no. 601 is given, but it is certain that the gamut of numbers to which it belongs was collected either during the exploration south to the Akarai Mts., on the Brazilian border, or about the Annai savannas.

Schomburgk's nos. 678 and 1032 appear on printed labels as from "Roraima." Schomburgk approached the base of that mountain from the south (Brazilian territory) along the Kukenam River. It will be noted that Schomburgk, Fauna u. Fl. Brit. Guiana 1084 (1848), reports *C. dichotoma* only from the banks of that Brazilian stream.

13. **Cordia sericicalyx** A. DeCandolle, Prodr. **9**: 485 (1845); Pulle, Enum. Pl. Surinam 397 (1906); not Johnston, Contr. Gray Herb. **92**: 54 (1930). *Lithocardium sericicalyx* (A. DC.) Kuntze, Rev. Gen. **2**: 977 (1891). *Cordia sericicalyx* var. *latifolia* Miquel, Stirp. Surinam. 140 (1850). *Cordia ierensis* Britton, Bull. Torr. Bot. Cl. **50**: 54 (1923).

Tree 3–6 m. tall, branching dichotomous; branchlets slender, finely strigose; leaves conspicuously heteromorphic, firm but rather thin and smooth, much paler beneath, finely strigose on both surfaces, veins repeatedly branched and anastomosing; larger leaves oblong to broadly lanceolate, 11–25 cm. long, 5–12 cm. broad, usually broadest below the middle, base obtuse or broadly acute, midrib somewhat arcuate, veins in 7–11 pairs, petiole densely strigose, 5–20 mm. long; smaller leaves elliptic to orbicular-ovate, 6–8 cm. long, 3–7.5 cm. broad; cymes loose, 5–20 cm. broad, branches slender, usually borne at the forks of the stems; calyx sessile, 5-toothed, outside completely covered with minute appressed silky hairs, inside above the middle densely villous-strigose with the hairs projecting a little beyond the edge of the calyx and so appearing as ciliate margins of the lobes; calyx at anthesis 3–4 mm. long, 1.5–2.5 mm. broad, unribbed, in fruit becoming explanate; corolla ca. 5 mm. long, glabrous, lobes obovate, filaments exserted, pilose near base; ovary and style glabrous; fruit glabrous; stone very rough, depressed, weakly asymmetric 8–10 mm. broad.

Ranging from Dutch Guiana westward to the Orinoco and apparently to Trinidad.

British Guiana: indefinite, *Schomburgk 109* (DC, type of *C. sericicalyx;* isotypes BD, P).

Dutch Guiana: Wayombo River near Cornelis Kondre, tall tree, fl. greenish white, Jan. 23, 1915, *B. W. 824* (Utr); Para District, in forest, Feb.-April, 1844, *Kappler 1510* (Utr, type of var. *latifolia;* isotypes, Leid, BD, Del, P).

Venezuela: lower Orinoco, 1896, *Rusby & Squires 282* (NY, K) and *259* (K).

In my paper on the Brazilian species of *Cordia* I incorrectly applied the name *C. sericicalyx* to the concept properly called *C. bicolor*. Some of the details of this confusion will be found discussed under *C. bicolor* in the present paper.

The type of *C. sericicalyx* is *Schomburgk 109,* given merely as from British Guiana. The species is not listed in Schomburgk's "Fauna und Flora von Britisch Guiana," although possibly it may be the basis for the otherwise unintelligible report of *C. heterophylla,* l. c. 960 (1848), which is listed as on the Demerara and Essequibo. Of all the cordias collected by the Schomburgks, *Cordia sericicalyx* has the most pronounced dimorphic leaves and hence is the one most apt to be associated with the appropriate but incorrect name, *C. heterophylla.*

The type of *C. sericicalyx* var. *latifolia* Miquel has been examined. It is not separable from the typical form of the species. Miquel gives the type of his variety as "*Kappler 1500.*" The type-specimen, however, is clearly numbered "*1510*"*!*

In defining *C. sericicalyx* I have excluded a very closely related form which seems to replace our Guianan plant across the northern parts of Venezuela and Colombia. This form, called *C. opaca* Rusby, is a more slender plant with more elongate, frequently more or less ribbed, fulvous calyces, very sparsely hairy, short filaments, and firmer, usually more lanceolate leaf-blades.

The specimen of *C. sericicalyx* from Cornelis Kondre is associated with two vernacular names. These are Omosé (Kar.) and Kakóro (Arow.).

14. **Cordia panicularis** Rudge, Pl. Rar. Guian. 30, tab. 46 (1805). *Lithocardium paniculare* (Rudge) Kuntze, Rev. Gen. **2:** 976 (1891).

Shrub or large tree, 3–20 m. tall, dichotomous or trichotomous; branchlets drying dark, sparsely strigose, loosely branched; leaves subhomomorphic, lucent, elliptic to lance-elliptic or broadly lanceolate, 1–2 dm. long, 4–7.5 cm. broad, broadest at or just below the middle, mature leaves usually drying quite brown, apex long-acuminate, base obtuse, both surfaces sparsely strigose or beset with minute very short ascending hairs arising from inconspicuous pustulate bases, lower surface slightly the paler; veins in 5–6 pairs, evident, repeatedly rebranched; petiole 5–10 mm.; cymes loose, 5–30 cm. broad, borne at the forks of the stem; calyx sessile, 5-toothed, 4–5 mm. long, subcylindric or obconic-cylindric, terete or very obscurely angulate, outside rather sparsely strigose, inside densely villous-strigose, becoming explanate in fruit; corolla glabrous, ca. 8 mm. long, lobes obovate to oblong, 2–3 mm. long, filaments hairy near base; ovary and style glabrous; fruit glabrous; stone very rugose, depressed, weakly asymmetric, 8–10 mm. broad.

Known only from the Guianas.

British Guiana: Potaro Landing, clearings and roadsides, shrub 3–4.5 m. tall, 1921, *Gleason 259* (NY, K); Tumatumari, dense upland forest, tall shrub, almost vine-like, 1921, *Gleason 156* (NY, K); Bootooba, sandhill in forest, Oct. 1924, *Persaud 184* (BD, NY).

Dutch Guiana: near Patricksavanna, in forest, May 1910, *native collector 182* (Utr); Brownsberg Summit, June 1924, tree 20 m. tall, *B. W 6513* and *6519* (Utr.).

French Guiana: Acarouani, fl. white, 1857, *Sagot 448* (K, P); Acarouani, 1854, *Sagot 448* (P); Acarouani, medium-sized tree or shrub, Oct. 1856, *Sagot* (K, P); Cayenne, *Martin ex herb. Rudge* (BM, TYPE); Cayenne, *Martin* (K, P); Cayenne, *Martin 151* (P).

The type of *C. panicularis* is a young flowering branch bearing leaves not yet stiff and somewhat coriaceous as they become in the mature state. Sagot has distributed under an unpublished name, sub no. 448, collections of this species made over several years which show both the young and the mature foliage. Although quite different in appearance I am confident that *C. panicularis* and *C. sericicalyx* are close relatives. The rough depressed glabrous fruits in these species are notably similar. The specimen from Brownsberg Summit is given as called "Berg Tafraboom."

15. **Cordia Sagotii,** sp. nov. *Cordia coriacea* Sagot ex Benoist, Archives Bot. 5, Mem. **1:** 257 (1933), not Killip (1927).

Frutex vel arbor 5–10 m. alta, dichotome ramosa; ramulis scabridis pilos minutos numerosos erectos vel ascendentes e basi incrassatos gerentibus; foliis homomorphis ellipticis vel late lanceolatis vel oblongis rigide coriaceis 15–30 cm. longis 7–14 cm. latis medium versus latioribus, basi rotundis vel obtusis vel acutis aliquantum obliquis, apice breviter acuminatis, supra sparse inconspicueque brevi-strigosis, subtus pilis numerosis brevissimis erectis asperatis, nervis 6–8-jugatis abundanter ramosis; petiolis 5–10 mm. longis; cymis saepe in furcis ramulorum ortis sed rariter ut videtur lateralibus, laxissime ramosis 1–3 dm. crassis; calyce in alabastro obovoideo ca. 3 mm. longo sparse striguloso, lobis triangularibus 5; corolla alba fragrante, tubo 4–5 mm. longo, lobis 1.5–2 mm. longis, filamentis 5–6 mm. longis basim versus pilosis; ovario et stylo glaberrimis; fructu glabro flavo; nuce anguste ovoideo erecto ca. 15 mm. longo laevi.

Known only from northeastern Dutch Guiana and northwestern French Guiana.

Dutch Guiana: Sectie O. Reserve, fl. white, Nov. 14, 1917, *B. W. 3414* (Utr); Sectie O. Reserve, tree no. 505, Oct. 23, 1916, *B. W. 1194* (Utr); Sectie O. Reserve, tree no. 506, fruit yellow, April 30, 1915, *B. W. 345* (Utr); Zanderij I. Reserve, tree 176, flower white, fragrant, Nov.

1915, Oct. 1917, Nov. 1919, April 1920, Jan. 1921 and Nov. 1921, *B. W. 1137, 3357, 4433, 4631, 5037* and *5565* (Utr); Zanderij I. Reserve, tree no. 230, fl. white, fragrant, Feb. 1, 1917, Feb. 14, 1917, July 1917, Oct. 1917, and Nov. 1918, *B. W. 2679, 2673, 3026, 3372* and *4067* (Utr.)

FRENCH GUIANA: banks of the Maroni, 1861, *Mélinon 243* (P); Godebert, 1920–21, *Wachenheim 81* and *207* (P); Charvein, fl. white fragrant, shrub 10 m. tall, Dec. 9, 1913, *Benoist 318* (P); Acarouani, medium-sized tree, mature leaves very coriaceous fl. white, fragrant, Dec. 1856, *Sagot 447* (TYPE of *C. coriacea* Sagot and *C. Sagotii*, Paris); Acarouani, 1856, *Sagot 447* (K, P); Acarouani, tall shrub, fl. white, fragrant, mature leaves very coriaceous, 1857, *Sagot 447* (K, BD, P); Acarouani, 1855, *Sagot 447* (K); indefinite, 1863, *Mélinon 63/96;* indefinite, 1862, *Mélinon 412* (P); indefinite, 1802, *Gabriel* (Del).

This species is represented in many herbaria of Europe by various collections of Sagot (all numbered 447). These are all determined as *C. coriacea* Sagot, a name unpublished until Benoist recently used it in his work on the timbers of French Guiana. Benoist has given an adequate botanical description (in French) of Sagot's species. The lengthy description of the wood-structures and the vernacular name, given by him, however, are based upon *Mélinon 88* which represents *Cordia hirta.* Since Benoist's formal botanical description is evidently based upon Sagot's collections and since his binomial was also evidently derived from them, I am content to accept Sagot's species as formally established by Benoist's description, especially since the description was not drawn to include Mélinon's herbarium specimen. Among the several collections of Sagot, obtained in various states of maturity over several years (but all distributed under the same collection-number) I have selected the specimen at Paris collected in Dec. 1856 as the type of *C. coriacea* Sagot. Unfortunately the name *C. coriacea* Sagot is a homonym of an earlier published name. Furthermore its publication by Benoist, because of the lack of a Latin diagnosis, is invalid. For these reasons the plant is described as a new species, *C. Sagotii.* The type is the same as that selected for *C. coriacea* Sagot.

The species is readily recognized by its very large rigid coriaceous leaves which have the midrib markedly bowed and the lower surface scabrous with minute short erect hairs. The glabrous fruit is erectly ovoid and yellow when mature.

The following vernacular names have been found on the labels accompanying specimens from Dutch Guiana—Tafraboom (Surinam Dutch), Kakóro (Arow.), Anoemalatti (Nig. Eng.), Danlieba (Sar.), Dokoa or Dokka (Arow.) and Anaakara (Kar.)—*B. W. 345;* Tafrabom, Arowtroeka (Arow.) and Kokoro konokodikoro (Kar.)—*B. W. 1194;* Tafelboom (Surinam. Dut.), Tafraboom (Nig. Eng.), Boggi lobbi and

Toenba lobbi (Sar.), Kakoro (Arow.) and Aratroeka (Kar.)—*Tree 176 at Zanderij I.*

16. **Cordia hirta,** sp. nov.

Arbor summum ad 20 m. alta, dicho- vel trichotome ramosa; ramulis brunneis saepe fulvo-hirsutis; foliis subhomomorphis ellipticis vel oblongo-oblanceolatis ad medium vel supra medium latioribus 8–18 cm. longis 3.5–7 cm. latis, basi acutis vel obtusis vel plus minusve rotundis, apice abrupte breviterque acuminatis, supra plus minusve scabris pilis abundantibus brevibus rigidis ascendentibus vestitis, subtus plus minusve velutinis pilis gracilioribus erectioribus ornatis, nervis 7–9-jugatis, petiolis hirsutis 4–9 mm. longis; cymis in furcis ramulorum ortis laxe ramosis 1–3 dm. crassis pilis rigidis erectis brunneis vestitis; calyce sessili in alabastro obovoideo 3–4 mm. longo vix costato extus brunneo-hispido intus sparse strigoso, lobis 5 triangularibus erectis; calyce fructifero explanato; corolla 5–6 mm. longa, lobis ca. 1.5 mm. longis rotundis recurvatis, filamentis exsertis basim versus pilosis; ovario et stylo glaberrimo; fructu glaberrimo; nuce anguste ellipsoidea valde ascendente 15–18 mm. longa vix rugosa.

French Guiana to eastern Venezuela, apparently in the mountains back from the coast.

Dutch Guiana: forest near Raleigh Falls, Coppename River, tree 20 m. tall, Aug. 26, 1920, *Pulle 317* (Utr); Raleigh Falls, July 29, 1923, *B. W. 6149* (Utr).

French Guiana: indefinite, 1863, *Mélinon 88* (P); indefinite, 1863, *Mélinon 113* (P).

Venezuela: Arabopo, slopes of Roraima, ¾ mile above Arabopo Swamp, 1260 m. alt., Jan. 1, 1928, *Tate 259* (type, New York); (??) Arabopo, slopes of Roraima, Jan. 1, 1928, *Tate 255* (NY).

This plant evidently frequents the hills. No locality is given for Mélinon's collections but his vernacular names, "Bois Calalon de montagne" and "Cèdre Calalon de serre basse" suggest that the specimens may have come from high ground up the Maroni where he is known to have collected. It is to be noted that the wood sample accompanying *Mélinon 88* is that described by Benoist, Arch. Bot. 5, Mem. **1:** 267 (1933), under the incorrect name of *C. coriacea* Sagot (= *C. Sagotii*). The species is a well marked one with its closest relation probably in *C. Sagotii,* from which it is quickly separable by its smaller leaves, and more copious longer brown pubescence.

17. **Cordia exaltata** Lamarck, Tab. Encyc. **1:** 422 (1791); Poiret, Encyc. **7:** 47 (1806); DeCandolle, Prodr. **9:** 484 (1845). *Lithocardium exaltatum* (Lam.) *Kuntze,* Rev. Gen. **2:** 977 (1841). *Cordia*

mucronata Poiret, Dict. Sci. Nat. **10:** 410 (1818). *Cordia scabrida* Martius ex Fresenius in Martius, Fl. Bras. **8**^{1}**:** 11, tab. 9, fig. 12 (1857); Johnston, Contr. Gray Herb. **92:** 62 (1930). *Lithocardium scabridum* (Mart.) Kuntze, Rev. Gen. **2:** 439 (1891).

Shrub or tree, 2–24 m. tall, branching dichotomous; branchlets dark, sparsely strigose; leaves somewhat scabrid, sparsely strigose on both surfaces, commonly more or less heteromorphic, usually drying olivaceous or muddy brown, tertiary veinlets evident; smaller leaves ovate to orbicular, 4–9 cm. long; larger leaves elliptic to broadly oblanceolate, broadest at or above the middle, 8–20 cm. long, 4–10 cm. broad, apex abruptly short-acuminate, base acute to somewhat rounded, veins in 6–8 pairs, petiole 5–10 mm. long, inflorescence borne at forks of stem, loosely branched, 1–2 dm. broad, somewhat scabrous, sparsely strigose or finely hirsute; calyx sessile, sparsely strigose outside, strigose inside the tube, pubescent on the inner face of the 5 regular triangular teeth, in the bud elongate, 4–5 mm. long, 1.5–2 mm. thick, apex rounded, not ribbed, in fruit explanate; corolla white, tube 5–7 mm. long, lobes ca. 2 mm. long, ovate; filaments long exserted, hairy at base; ovary and style glabrous; fruit glabrous, orange-yellow or red; stone ellipsoid, erect or nearly so, 1–1.5 cm. long, not irregularly roughened.

Lower Amazon Valley and along the coast into French Guiana.

FRENCH GUIANA: Cayenne, *Martin* (P); "Cayenne, *Martin*" (herb. Poiret, TYPE of *C. mucronata*); Cayenne, *Perrottet* (Del, P); indefinite, *Leprieur sine no.* (K, Del, DC) and *164* (K, P); indefinite, *Poiteau* (K, Del); indefinite, *Richard* (K, Del); indefinite, *ex Richard* (herb. Lamarck, TYPE of *C. exaltata*).

17a. **Cordia exaltata** var. **melanoneura** [Klotzsch], var. nov. *Cordia melanoneura* Klotzsch ex Schomburgk, Fauna u. Fl. Brit. Guiana 960 (1848), nomen.

A forma typica differt foliis ellipticis vel oblongo-ovatis medio vel infra medium latissimis in sicco plus minusve spadiceis apice longe acuminatis; inflorescentia saepe lata et laxa.

Known only from middle and western British Guiana.

BRITISH GUIANA: Gravee Creek, Kaituma River, N.W. Dist., fairly high tree, Oct. 28, 1908, *Anderson 103* (K); Assakatta, lat. 7° 45′ N., long. 59° 5′ W., Sept. 1923, *La Cruz 4322* (G); Waini River, lat. 8° 20′ N., long. 59° 40′ W., tree 6 m. tall, April 1923, *La Cruz 3855* (G); Santa Rosa, Moruka River, Pomeroon Dist., tree 9 m. tall, fl. white, Aug. 1921, *La Cruz 1015* (G); Moruka River, July 1927, *La Cruz 4522* (G); Waramuri Mission, Moruka River, 9 m. tall, fl. white, Oct. 1922, *La Cruz 2399* (G); Tabla, Pomeroon Dist., fl. white, Sept. 1921, *La Cruz 1224* (G); banks of the Pomeroon, Aug. 1843, *Schomburgk 1398* (BD, TYPE of *C. melanoneura*); Mazaruni River, Aug. 1889, *Jenman 5475* (NY, K, BM); opposite Bartica, April 1887, *Jenman 3625* (K, NY); Moraballi Creek near Bartica, tree 24 m. tall, trunk 25 cm. thick, fl. white, Aug. 26, 1929, *Sandwith 118* (K); Essequibo River, Aug. 1889, *Jenman 5817* (K); indefinite, *Schomburgk 842/1398b* (K), *842* (Del) and *840* (P).

The type of *Cordia exaltata* is said to have come from Richard. In the General Herbarium at Paris there are two good specimens of this species collected by Richard, one bearing mature, and the other very young fruit. Neither collection is provided with exact geographical data though they are provided with the collector's detailed field-notes. The specimen with young fruit, of which Lamarck's type may be a duplicate, is given as "arbor 12–25 pedalis, trunco recto cortice griseo laevissimo, ramis expansis." The other specimen has the following (abbreviated) field-notes, Arbor 20–40 pedalis, ramis patentibus ramosis saepius ternatis, divaricatis; folia sparsa pulchre viridia; bacca elliptica, laevissima, glabra, nitens, flavescens; pulpa glutinosa viscosa; in sylvis variis; dec. fructus maturant.

Poiret's material of his *C. mucronata* consists of two small fragmentary specimens which are so much alike that I believe they are parts of a single collection. Leaves, flowers, and fruit are represented. The material is undoubtedly conspecific with the type of *C. exaltata*. Martin probably collected it about La Gabrielle to the southeast of Cayenne. The species enters French Guiana from the coastal area of Brazil and probably does not extend much northwest of Cayenne.

Cordia scabrida, which has been repeatedly collected in the area about the city of Pará and also about Santarem further up the Amazon, is evidently conspecific with the plant of French Guiana. Exploration will no doubt show that it is present along the north bank of the lower Amazon and in the coastal forests of Brazil towards the Guianan border.

The characters I am able to give for the plant of British Guiana, which I call *Cordia exaltata* var. *melanoneura*, do not separate it sharply from typical *C. exaltata*, but I am of the opinion that the British Guianan plant merits at least varietal and possibly even specific rank. Geographically, it is separated from *C. exaltata* by half of French, half of British, and all of Dutch Guiana. The leaves usually differ in shape and in the characteristic warm brown they assume in drying. Most of the material of the species and variety can be sorted rapidly and accurately merely on the basis of differences in gross aspect. The species *C. melanoneura* first appeared in Schomburgk's book, l. c., where it is said to grow on the banks of the Pomeroon River. This is in the very region in which the var. *melanoneura* has been most collected. The following vernacular names appear on herbarium specimens of the variety, Table Tree—*Sandwith 118;* Yowanarow and Iguana Tree—*Anderson 103.*

18. **Cordia naidophila,** sp. nov.

Arbor minor dichotome ramosa; ramulis fuscatis dense adpresseque cinereo-hirsutulis; foliis homomorphis ovatis vel elliptico-ovatis 6–11 cm. longis 4–5 cm. latis medium versus vel infra medium latioribus, basi acutis vel rotundis, apice graciliter acuminatis, utrinque scabris pilis abundantibus brevibus rigidis antrorse adpressis asperatis, nervis 5–8-jugatis, nervulis abundanter ramosis, petiolis ca. 5 mm. longis; cymis in furcis ramulorum ortis laxe graciliterque ramosis; calyce strigo in alabastro 2–3 mm. longo 2 mm. crasso subgloboso intus supra medium strigoso, lobis 5 triangularibus; corolla alba tubo 2–3 mm. longa, lobis ca. 2 mm. longis, filamentis ca. 2.5 mm. longis basim versus pilosis; ovario et stylo glaberrimo; fructu glabro; nuce obovoideo erecto ca. 12 mm. longo.

In the upper Amazon Basin, particularly in the drainage of the Rio Negro, Brazil.

VENEZUELA: near San Carlos, headwaters of the Rio Negro, 1853–54, *Spruce 2960* (G).

BRAZIL: Manáos, Agricultural Experiment Station, tree 2.5–3 m. tall, corolla creamy white, Oct. 13, 1929, *Killip & Smith 30008* (TYPE, Gray Herb.); Barra, Oct. 1819, *Martius* (BD); Marary Juruá, Sept. 1900, *Ule 5191* (BD).

This plant of the upper Amazon Basin has been confused with *C. silvestris* Fresen., of the coastal states of southeastern Brazil, but differs in having the upper leaf-surfaces, dull rather than more or less glossy and abundantly rather than very sparsely hairy. The lower surface of the leaves in *C. naidophila* is regularly strigose in a manner quite like the upper surfaces. In true *C. silvestris* the lower face of the leaves is very finely strigose and usually coarsely hairy as well; the upper face is sparsely hairy or nearly glabrous. Specimens of *C. naidophila* have been referred to *C. silvestris* by Fresenius in Martius, Fl. Bras. **8**^{1}: 13 (1857) and by Johnston, Contr. Gray Herb. **92**: 61 (1930).

19. **Cordia grandiflora** (Desv.) Humboldt, Bonpland & Kunth, Nov. Gen. et Sp. **3**: 77 (1818); Fresenius in Martius, Fl. Bras. **8**^{1}: 21 (1857); Johnston, Contr. Gray Herb. **92**: 21 (1930). *Varronia grandiflora* Desvaux, Jour. de Bot. **1**: 273 (1809); Poiret, Encyc. Suppl. **3**: 730 (1814); von Friesen, Bull. Soc. Bot. Genève, sér. 2, **24**: 170, fig. 8 (1933). *Lithocardium grandiflorum* (Desv.) Kuntze, Rev. Gen. **2**: 977 (1891). *Varronia lantanoides* Willdenow ex Chamisso, Linnaea **4**: 492 (1829), in synonymy. *Cordia rufa* Klotzsch in Schomburgk, Fauna u.

Fl. Brit. Guiana 960 (1848), nomen. *Varronia grandiflora* var. *glabrata* von Friesen, Bull. Soc. Bot. Genève sér. 2, **24:** 171, fig. 8e (1933). *Varronia grandiflora* var. *Sprucei* von Friesen, Bull. Soc. Bot. Genève sér. 2, **24:** 148 (1933), nomen.

Shrub, 1–3.5 m. tall; stems clothed with slender appressed hairs; leaves triangular-ovate to lanceolate, with rather conspicuous veins, 4–10 cm. long, 1.5–5 cm. broad, base quite obtuse, margin conspicuously crenate-dentate, upper surface with slender appressed or ascending hairs, usually strigose, lower surface with shorter and more slender hairs, petioles 1–2 cm. long; inflorescence capitate, terminal, 1.5–2 cm. thick, peduncle 5–15 cm. long; calyx coarsely strigose, 7–10 mm. long, lobes long attenuate, the tips linear and free (ca. 2 mm. long) in the bud; corolla white, very large, 3.5–5 cm. long, tube 5–9 mm. long and 2 mm. thick, abruptly expanded into the coarse cylindrical throat (9–14 mm. thick); fruit ca. 9 mm. long, elongate, invested by calyx nearly to its apex.

British Guiana to central Venezuela and southward into the Amazon Valley.

British Guiana: Essequibo, Jan. 1842, *Schomburgk 358* (BD, type of *C. rufa*); Essequibo, *Appun 2514* (K); Mamette, Rupununi River, Oct. 1889, *Jenman 5533* (K).

Venezuela: Ciudad Bolivar, ca. 35 m. alt., June 1931, *Holt & Blake 740* (G); Paloma, lower Orinoco, March 1896, *Rusby & Squires 14* (G, BM, BD); Angostura, *Moritz* (BD).

Brazil: Rio Trombetas, vicinity of Obidos, shrub ca. 25 dm. tall, growing into the water, corolla white, Dec. 1849, *Spruce 515* (G, K, BM); Rio Branco, herbaceous, growing by side of river, corolla white, Sept. 1858, *Schomburgk 817* (K, BM, Del).

This remarkable species was first collected by Humboldt & Bonpland near San Fernando de Apure, Venezuela, just west of the great bend of the Orinoco. The material collected was described as *Varronia grandiflora* by Desvaux. *Cordia rufa* Klotzsch is a name based upon a collection made by Schomburgk (no. 358) on the Essequibo in British Guiana. It has never been described. Schomburgk in his catalogue mentions it only from the upper Essequibo. The Schomburgk brothers, however, made two collections of this species. A study of Robert Schomburgk's field-notes at Kew shows that his collection no. 817, labeled and distributed as from British Guiana, is in fact from Brazil, from the Rio Branco almost certainly between São Joaquin and Pirara.

20. **Cordia polycephala** (Lam.), comb. nov. *Varronia polycephala* Lamarck, Tab. Encyc. **1:** 418 (1791). *Lantana corymbosa* Linnaeus, Sp. Pl. 628 (1753), not *C. corymbosa* Willd. ex R. & S. (1819). *Var-*

ronia monosperma Jacquin, Pl. Rar. Hort. Schoenbr. **1**: 18, tab. 39 (1797). *Cordia monosperma* (Jacq.) Roemer & Schultes, Syst. **4**: 463 (1819). *Varronia dichotoma* Ruiz & Pavon, Fl. Peruv. **2**: 23, tab. 146 (1799), not *C. dichotoma* Forst. (1786). *Varronia ulmifolia* Jussieu ex Dumont-Courset, Le Bot. Cult. ed. 1, **2**: 148 (1802), nomen. *Cordia ulmifolia* (Juss.) DeCandolle, Prodr. **9**: 494 (1845), not *C. ulmifolia* Spreng. (1825). *Varronia corymbosa* Desvaux, Jour. de Bot. **1**: 275 (1809), not "*V. corymbosa* L." ex Desf. (1804), nomen. *Cordia corymbosa* (Desv.) Don, Gen. Syst. **4**: 383 (1838), not *C. corymbosa* Willd. ex R. & S. (1819). *Cordia bifurcata* Roemer & Schultes, Syst. **4**: 466 (1819). *Cordia corymbosa* of Urban, Symb. Ant. **4**: 519 (1910), and most subsequent authors; Johnston, Contr. Gray Herb. **92**: 30 (1930). *Cordia patens* sensu Pulle, Enum. Pl. Surinam 398 (1906). — *Periclymenum rectum, salviae foliis majoribus, etc.*, Sloane, Nat. Hist. Jamaica **2**: 83, tab. 194, fig. 3 (1725). *Ulmi angustifoliae facie Baccifera Jamaicensis etc.*, Plukenet, Phytogr. tab. 328, fig. 5 (1691) and Almag. Bot. 393 (1694).

Slender shrub, 1–5 m. tall, frequently subscandent; stems with appressed or somewhat spreading indument of intermixed short and long hairs; leaves ovate to lanceolate, 2–12 cm. long, 1–5 cm. broad, base acute to obtuse or nearly rounded, apex acute, margin toothed or subentire, upper surface bearing numerous minute limy tuberculations, very sparsely strigose, under surface usually brown, commonly finely and densely tomentulose, on the veins bearing slender appressed or ascending coarser hairs; petiole slender, 3–10 mm. long, decurrent 1–3 mm. on the subtended branchlet and peduncle; cymes usually densely glomerate, subglobose, 5–15 mm. thick, rarely expanding and becoming loosely flowered and the branches more or less evidently dichasial and scorpioid; peduncles axillary and terminal; calyx strigose, 2–3 mm. long, lobes broad, the tips not free in the bud, at maturity calyx tightly investing the fruit nearly to the apex; corolla white, 4–5 mm. long; fruit red, stone 4–5 mm. long, ovoid or subglobose.

Very widely distributed in the warm parts of America.

BRITISH GUIANA: Pirara, Jan. 1842, *Schomburgk 601* (BD); savannas, shrub 3–4 m. tall, fl. white, *Schomburgk 382* (K, BM, Leid, BD, DC, P); Nigate, Nealu, Corantyne River, a few feet tall, Oct. 1879, *Jenman 367* (K); indefinite, *Schomburgk 384* (BM).

DUTCH GUIANA: Matappi, Corantyne River, June 18, 1916, *B. W. 2153* and *2174* (Utr); common on backlands of Paramaribo Gardens, 2–2.5 m. tall, June 1910, *Stockdale 8823* (K); near Paramaribo, frequent, shrub 2.5–3 m. tall, fl. white, Nov. 1837, *Splitgerber 72* (Leid); near Paramaribo, *Focke 755* and *1132* (Utr); near Paramaribo, shrub 2 m. tall, *Kuy-*

per 20 (Utr); near Paramaribo, 1910, *native collector no. 117* (Utr); near Paramaribo, *Kegel 109* (P); edge of forest near Paramaribo, fl. yellow, 1844, *Kappler ed. Hohenacker 1570* (P); Plant. Liberté, edge of forest, fl. white, shrub 2.5 m. tall, 1933, *Lanjouw 223* (Utr); Plant. Rust en Werk, Aug. 5, 1913, shrub 4 m. tall, *Soeprato 60* (Utr); Slootwijk, Commewyne River, roadside shrub 1 m. tall, July 1913, *Soeprato 29G* (Utr); Bloemendal Boite, June 4, 1913, 2 m. tall, *Soeprato 25A* (Utr); Leonsberg, Aug. 8, 1913, *Soeprato 127* (Utr); near Plant. Jagtlust, Aug. 1901, *Went 64* (Utr); Para District, 1919, *Kuyper 20* (Utr); lower Commewyne River near Plant. Maasstroom, *Focke 1358* (Utr); indefinite, *Hostmann 292* (K, BD, P), *Hostmann sine no.* (Leid), *Focke 1355* (G, Utr), and *Leschenault* (P); indefinite, 1841, *Berthoud-Coulon 551* (BM).

BRAZIL: Rio Negro, Jan. 11, 1887, *Moura 568* (BD); between mouth of Rio Negro and the Capoenas, shrub 2.5 m. tall, July 1851, *Spruce 1695* (K, BM); Igarape Burete, Pracuá, Rio Surumu, Feb. 1909, *Ule 7962* (BD).

VENEZUELA: lower Orinoco, 1896, *Rusby & Squires 309* (G).

This is the most widely distributed species of *Cordia* in America and, in many regions, one of the commonest. Its nomenclatorial history is involved. Its list of synonyms is a long one. Above I have given merely the oldest names, those published down to and including the Systema by Roemer & Schultes, vol. 4, in 1819. Since 1845 the plant has been called either *C. ulmifolia* or *C. corymbosa.* A study of these names proves them to be illegitimate on several grounds.

The name *C. ulmifolia* was sponsored by DeCandolle, Prodr. **9**: 494 (1845). Those who followed him cited the name "*Cordia ulmifolia* Juss. in Dum. Cour., Bot. Cult. **2**: 148 (1802)." A study of the work cited, however, shows that the name was actually published under *Varronia* and that no description was provided. It is a mere garden name! *Varronia ulmifolia* Juss. was accepted by no one until DeCandolle took it up and transferred it to *Cordia.* Previously, however, Sprengel, Syst. **1**: 653 (1825), had applied the binomial *Cordia ulmifolia* to another concept. *Cordia ulmifolia* (Juss.) DC. is hence a late homonym, besides being based upon a mere garden name.

The name *C. corymbosa* seems to have been introduced by Urban, Symb. Ant. **4**: 519 (1910). It has been universally accepted in recent years. The basic synonymy given by Urban and repeated by subsequent authors is as follows,—*Cordia corymbosa* (L.) Don, Gen. Syst. **4**: 383 (1838) and *Lantana corymbosa* L. Sp. Pl. 628 (1753). The name-bringing synonym is based upon several pre-Linnaean references all of which refer to our concept. *Cordia corymbosa* Don, however, is not based upon *Lantana corymbosa* but upon *Varronia corymbosa* Desvaux, Jour. de Bot. **1**: 275 (1809). This latter name is expressly a renaming of *C. monosperma* Jacq. Both Desvaux l. c. 277 and Don, l. c. 385, cite *Lan-*

tana corymbosa L. among the synonyms of *Varronia* (or *Cordia*) *lineata!!* The name *Cordia corymbosa* Don, can not be used for our plant in any case. It is antedated by *Cordia corymbosa* Willd. ex R. & S., Syst. **4**: 801 (1819). Hence, since the name *Cordia corymbosa* Don is not based upon *Lantana corymbosa* L., and since it is invalid through being a later homonym, it must be rejected.

Although it is the oldest name applied to our plant, *Lantana corymbosa* L. can not be transferred to *Cordia* because of two earlier published homonyms. The next oldest name used for our plant is *Varronia polycephala* Lam., which is based upon a phrase-name and illustration given by Plukenet. Transferred to *Cordia* Lamarck's name becomes the correct one for the present concept.

Various names cited by me in my formal list of synonyms have, at one time or another, been involved with binomials which I would refer to other species. The most important of these are *Varronia lineata* L. and *V. humilis* Jacq. Since these two names seem primarily based upon the notes and description given by Browne, Nat. Hist. Jamaica 172, tab. 13, fig. 1 (1759), I identify them with the plant current as *C. globosa* (Jacq.) HBK. Browne's plant has the short pedunculate, terminal, globose flower-heads and the subulate calyx-lobes of that common West Indian species.

The Guianan plants represent the typical West Indian form of *Cordia polycephala,* which is characterized by having the lower surfaces of the leaves densely and finely tomentulose. In South America, the typical form is found in our area, and in the country south along the Andes. One collection from Dutch Guiana, according to the label, is called, "Man blala oema" (*native collector 117*).

21. **Cordia macrostachya** (Jacq.) Roemer & Schultes, Syst. **4**: 461 (1819). *Varronia macrostachya* Jacquin, Enum. Pl. Insul. Carib. 14 (1760) and (*C. macrostachia*) Select. Stirp. Amer. 41 (1763); Desvaux, Jour. de Bot. **1**: 272 (1809). *Varronia guianensis* Desvaux, Jour. de Bot. **1**: 270 (1809). *Cordia gujanensis* (Desv.) Roemer & Schultes, Syst. **4**: 460 (1819); (*C. guianensis*) Meyer, Nov. Acta Acad. Caes.-Leop. Car. **12**^{2}: 778 (1825). *Montjolya guianensis* (Desv.) von Friesen, Bull. Soc. Bot. Genève sér. 2, **24**: 181 (1933). *Cordia interrupta* DeCandolle, Prodr. **9**: 491 (1845). *Cordia oxyphylla* DeCandolle, Prodr. **9**: 492 (1845). *Lithocardium oxyphyllum* Kuntze, Rev. Gen. **2**: 977 (1891). *Cordia graveolens* Humboldt, Bonpland & Kunth, Nov. Gen. et Sp. **3**: 74 (1818); Miquel, Stirp. Surinam. 141 (1850); Pulle, Enum. Pl. Surinam 398 (1906). *Varonia martinicensis* sensu Aublet, Hist. Pl. Guian. Fr. **1**: 232 (1775); of Poiret, Encyc.

4: 264 (1797), as to *Leblond 370*. ? *Cordia cylindrostachya* sensu Schomburgk, Fauna u. Fl. Brit. Guian. 960 (1848). ? *C. salicina* sensu Garcke, Linnaea **22:** 68 (1849). *Varronia cylindrostachya* sensu Graham, Ann. Carnegie Mus. **22:** 240 (1934).

Shrub 1–2.5 m. tall, younger parts bearing minute resinous granules; stems more or less strigose or with stiff incurved hairs; leaves lanceolate to oblong-ovate, elongate, 5–10 (–20) cm. long, 1–3 (–10) cm. broad, base obtuse or acute, contracted into a petiole 5–20 (–30) mm. long, apex obtuse to acute, margin denticulate to evidently dentate or sinuate-dentate, upper surface smooth to scabrous and characteristically glabrous, bearing small limy tuberculations or murications which are low or somewhat prominent (rarely each bears a very short erect hair), lower surface pale, with soft curved hairs on the veins and veinlets; peduncles terminal, distinct from the petioles, 2–10 cm. long, slender; spikes 5–10 cm. long, becoming rather loosely flowered at maturity; calyx granulate and usually somewhat strigose, ca. 3 mm. long at anthesis, the tips of the triangular lobes not free in the bud; corolla white, ca. 5 mm. long; fruit red, invested to beyond the middle by the cupulate calyx; stone broadly ovoid, 4–5 mm. long.

Northern South America and northward into Central America and the West Indies.

British Guiana: Frechal, dry savanna, shrub, fl. white, fruit red, Sept. 6, 1927, *Tate 37* (NY); Pomeroon River, 25 dm. tall, 1922–23, *La Cruz 3041–3145* (G); Demerara, coastal region, 12 dm. tall, 1881, *Jenman 1501* (K, P); vicinity of Demerara, 1824, *Parker* (DC, type of *C. interrupta*); Georgetown, wild land in the Botanic Garden, fl. white, Oct. 1919, *Hitchcock 16535* (G, NY); coast lands, June 1889, *Jenman 5206* (NY).

Dutch Guiana: Corantyne River, 1911, *Hulk 99* (Utr); near Paramaribo, 1910, *native collector 41* (Utr); near Paramaribo, 2–3 m. tall, *Essed 120* (Utr); near Paramaribo, 1904, *Essed 120* (Utr); Paramaribo, Aug. 1901, *Went 305* (Utr); Paramaribo, June 1903, *Versteeg 464* (Utr); Paramaribo, Jan. 1901, *Went 570* (Utr); Paramaribo, shrub 1–2 m. tall, *Kuyper 34* (Utr); near Paramaribo, shrub 2–2.5 m. tall, fl. white, fruit red, Nov. 1837, *Splitgerber 44* (Utr); Paramaribo near Agricultural Experiment Station, marshy land, fl. white, shrub ca. 1 m. tall, 1933, *Lanjouw 65* (Utr); near Paramaribo on road to Plant. Leonsberg, Aug. 1920, *Pulle H48* (Utr); Leonsberg, 1913, *Soeprato 135* (Utr); between Kwatta and Paramaribo, Feb. 28, 1900, *Tulleken 67* (Leid); Div. Q, forest of Agric. Experim. Station, Paramaribo, 1916, *Samuels 60* (G, K, Leid, BD, P); La Liberté, 1 m. tall, 1913, *Soeprato 235* (Utr); Post Sommelsdijk, lower Commewyne River, July 1913, *Soeprato 37* (Utr); Plant. Domburg near Surinam River, Aug. 23, 1900, *Tulleken 265* (Leid); Para District, in woods, shrub, fl. white, April 1838, *Splitgerber 1160* (Leid); Matappica, Dec., *Focke 279* (Utr); Lawa River, Oct. 1903, *Versteeg 298* (Utr); upper

Commewyne River, in forest, *Focke 213* (Utr); indefinite, *Focke 282* and *446* (Utr), *Tulleken 17* (Leid), *Hostmann sine no.* (Leid) and *Hostmann 323* (K, BM, BD, Del, P); indefinite, 1823–24, *Leschenault* (Leid, P).

FRENCH GUIANA: Acarouani, cultivated, "var. inodora," 1856, *Sagot* (P); Mana, shrub, leaves fragrant, 1857, *Sagot 444* (K, P); Mana, shrubby, leaves fragrant, fl. white, *Sagot 444* (P); Iles du Salut, shrub 5–15 dm. tall, fragrant, fruit red, March 1856, *Sagot* (P); Iles du Salut, shrub with fragrant leaves, 1854, *Sagot 444* (K, BM, P); Cayenne, *von Rohr* (BM); Cayenne, 1853, *Rothery 202* (K, BM) and *sine no.* (BM); near Cayenne in savannas, shrub, fl. white, fruit rose-colored, June 1921, *Broadway 573* (G, NY, K); Cayenne, aromatic shrub, fl. white, fruit red, April 1897, *Soubiron* (P); Cayenne, very common about town, *Richard* (Paris, TYPE of *V. guianensis*); near Cayenne, shrub near sea, fl. white, fruit red, April 1921, *Broadway 49* (G); indefinite, 1820, *Perrottet 212* (DC, TYPE of *C. interrupta*); indefinite, 1792, *Leblond 370* (Del, Lamarck).

The type of *Varronia macrostachya* Jacq. comes from Cartagena. It is briefly described, and then largely through comparison with *V. curassavica* Jacq., but with little doubt is evidently conspecific with our common Guianan shrub. Our plants are remarkably similar to some I have seen from Cartagena. Among the spicate varronias of the coastal area of northern South America *C. macrostachya* is characterized by its glabrous upper leaf-surfaces, usually large leaves, and elongate slender terminal spikes. In dry localities the leaves tend to become smaller and the spikes short. In these phases the plant is distinguished from *C. curassavica* Jacq. only by the absence of hairs on the upper side of the leaves.

Desvaux's *Varronia guianensis* evidently applies to this plant. The vernacular name, "Montjoly," and Aublet's discussion which are mentioned by Desvaux, both apply to our plant. There is a sheet from the Desvaux collections at Paris which is determined as *V. guianensis* by Desvaux. The specimen is labeled merely as from South America, except that it is given as a shrub, no other data concerning it is given on the accompanying label. The specimen, however, is almost certainly a duplicate of one, also at Paris, collected by Richard and labeled as "frequentissima in suburbanis, Cayenne." This information as to locality is that given by Desvaux as the source of his species. I consider the specimens as types of the species.

The type of *C. interrupta* was collected by Perrottet. It is given merely as from French Guiana and it consists of a leaf of *C. tomentosa* and a branch of *C. macrostachya*. A comparison of this type-material in the Prodromus Herbarium with other Perrottet material in the Delessert collections, at Geneva, shows such a close agreement in details of discoloration, etc., etc., that we may well believe them parts of one collection. The material in the Delessert Herbarium is labeled as from "Mana, 1820, *Perrottet*."

Humboldt and Bonpland collected material near Angostura on the Orinoco which seems to be good *C. macrostachya*. The material, however, was described as a new species, *Cordia graveolens* HBK. Further up the Orinoco, perhaps in very shaded humid locations, there have been collected plants evidently related to *C. graveolens*, though differing in having the upper leaf-surfaces quite smooth and bearing only minute very scattered microscopic limy disks and resinous granulations. This form was described as *Cordia polystachys* HBK. and *C. canescens* Willd., from the Mapure. Spruce (no. 3012) has collected a quite similar plant near the Brazil-Venezuela border. The type of another species, *C. spicata* Willd., given as from Angostura, seems to be an essentially similar form.

The material given as collected by Richard in Cayenne by Poiret, Encyc. **4**: 264 (1797), under the name *Varronia curassavica*, differs from all Guianan plants and is, I believe, West Indian. Desvaux, Jour. de Bot. **1**: 271 (1808), and later Poiret, Encyc. Suppl. **3**: 728–29 (1814), associate this specimen with *V. angustifolia* West. of the island of St. Croix. This is probably correct.

In the Lamarck herbarium there are only two sheets labelled *V. martinicensis*. This material belongs to Leblond no. 370 and is the basis of the description of *V. martinicensis* by Poiret, Encyc. **4**: 264 (1797). Desvaux referred the plant to *V. curassavica*, but I consider it quite representative of *C. macrostachya*.

It should be noted that plants of eastern Brazil (from Ceará southward to Rio Grande do Sul), which I have treated as *Cordia verbenacea* DC., cf. Johnston, Contr. Gray Herb. **92**: 25 (1930), is verly closely related to *C. macrostachya* and perhaps should be accepted as a form of it.

The present species seems to be well known in French Guiana under the name "Montjoly." In several collections from Dutch Guiana the plant is given as called "Blaka oema."

22. **Cordia Schomburgkii** DeCandolle, Prodr. **9**: 490 (1845); Schomburgk, Fauna u. Fl. Brit. Guiana 960 (1848); Garcke, Linnaea **22**: 68 (1849); Pulle, Enum. Pl. Surinam 397 (1906). *Lithocardium Schomburgkii* (DC.) Kuntze, Rev. Gen. **2**: 977 (1891). *Cordia lucida* Splitgerber ex Pulle, Enum. Pl. Surinam 397 (1906), nomen sub *C. Aubletii*. *Cordia tobagensis* Urban in Fedde, Rep. Spec. Nov. **16**: 39 (1919). *Cordia tobagensis* var. *Broadwayi* Urban in Fedde, Rep. Spec.

Nov. **16**: 40 (1919). (?) *Cordia Aubletii* sensu Schomburgk, Fauna u. Fl. Brit. Guiana 960 (1848). *Cordia polystachya* sensu Schomburgk, Fauna u. Fl. Brit. Guiana 1151 (1848). *Cordia patens* var. *polycephala* sensu Miquel, Stirp. Surinam. 140 (1850). *Cordia Aubletii* sensu Pulle, Enum. Pl. Surinam 397 (1906). *Varronia guianensis* sensu Graham, Ann. Carnegie Mus. **22**: 239 (1934).

Shrub 1–4 m. tall; stems with a thin indument of fine curved pubescence and intermixed short coarse curved bristles; leaves ovate to elliptic or lance-elliptic, 5–10 cm. long, 2–7 cm. broad, base obtuse or nearly rounded, apex acute, margin entire to sharply dentate, upper surface drying brown, usually somewhat lustrous, distinctly and simply strigose, lower surface pale, covered with a fine minute curved puberulence, petiole slender 6–9 mm. long, decurrent 5–8 mm. on the subtended branchlet or peduncle; peduncles axillary, slender, ascending, up to 9 cm. long; spikes elongate and loosely flowered, 5–15 cm. long; calyx nearly glabrous, bearing numerous resinous granules, with a few bristles about the apex, the tips of the deltoid lobes not free in the bud, calyx at anthesis or when sterile vase-shaped or funnel-form and 3–4 mm. long, at maturity expanded by the enlarging fruit; corolla white, ca. 4 mm. long; fruit red, tightly ensheathed by the calyx; stone ovoid 4–5 mm. long.

Known only from British, Dutch and French Guiana and from Trinidad and Tobago.

BRITISH GUIANA: banks of the Barama, Oct. 1843, *Schomburgk 1510* (BD); Tumatumari, Potaro River, along trail in forest, shrub 2.5–3 m. tall, fl. white, Jan. 1920, *Hitchcock 17382* (G, NY); Penal Settlement, 1911, *Hitchcock 17150* (K); upper Mazaruni River, long. 60° 10′ W., fl. yellow, 8–12 dm. tall, Sept. 1922, *La Cruz 2343* and *2260* (G, NY); Mazaruni, *Appun 293* (K); Kamakusa, upper Mazaruni, long. 59° 50′ W., Nov. 1922, *La Cruz 2882* (G, NY); Kyk-over-all, near Kartabo, bushy shrub 3 m. tall, July 1924, *Graham 215* (NY); Kartabo, large shrub in clearing, Aug. 11, 1920, *Bailey 170* (G); Kalacoon, shrub in clearing, fruit red, Aug. 23, 1920, *Bailey 170* (G); Kalacoon, shrub 15 dm. tall, along creek, June 1924, *Graham 133* (NY); banks of Rupununi, May 1843, *Schomburgk 1304* (BD, as *C. polystachya*, det. Kl.); Demerara, *Parker* (K); Kamuni Creek, Demerara River, March 1889, *Jenman 4919* (K); Malali, Demerara River, lat. 5° 35′ N., 1922, *La Cruz 2678* (G, NY); Christianburg, Demerara River, 1910, *Anderson 553* (K); Vryheid, Demerara River, fl. white, Feb. 15, 1924, *Linder 61* (G, NY); between Demerara and Berbice rivers, ca. lat. 5° 50′ N., 18 dm. tall, fl. white, *La Cruz 1594* (G, NY); Berbice, 1837, *Schomburgk 406* (Del); indefinite, 1838, *Schomburgk 406* (DC, TYPE of *C. Schomburgkii*; isotypes, K, BM, Leid, BD, P); Canje Creek, Aug. 1908, *Bartlett* (NY).

DUTCH GUIANA: upper Nickerie River, Feb. 24, 1915, *B. W. 1035*

(Utr); Saramacca River, Dec. 1902 and Jan. 1903, *Pulle 125* and *417* (Utr); Heidoti, Saramacca River, 1920, *B. W. 4621* (Utr); road near Paramaribo, 1842, *Focke 816* and *760* (Utr); near Paramaribo, shrub 2.5–3.5 m. tall, fl. white, Dec. 1837, *Splitgerber 206* (Leiden, TYPE of *C. lucida*); Plant. Liberté, lower Surinam, edge of forest, shrub 2–3 m. tall, fl. white, 1933, *Lanjouw 224* (Utr); Para District, forest, fl. white, April 1838, *Splitgerber 1161* (Leid); Para District, June 1904, *Versteeg 507* (Utr); Plant. Guineesche Vriendschap, 1915, *Soeprato 313* (Utr); Carolina Creek, Para River, May 1921, *B. W. 5123* (Utr); near Guyana placer mines, Oct. 1909, *Boldingh 3918H* (Utr); Kadjoe, Surinam River, May 1910, *native collector* (Utr); Koemba Rapids, upper Surinam River, July 1908, *Tresling 232* (Utr, BD); indefinite, *Hostmann* (Leid), *Hostmann 295* (Utr, P), *Hostmann 877* (G, K, BM, Utr, BD, Munich, Del, P), *Kappler 877* (P) and *Focke* (K).

FRENCH GUIANA: St. Laurent du Maroni, shrub 2–3 m. tall, fl. white, Jan. 15, 1914, *Benoist 604* (P); St. Jean, shrub 2 m. tall, fl. white, May 16, 1914, *Benoist 1223* (P); Mana, fl. white, 1858, *Sagot 1169* (K, BM, P); Godebert, Jan. 1920, *Wachenheim 79* (K, BM, P), *101* (G, K, BM, P) and *352* (P).

The species is most nearly related to *C. Poeppigii* DC., of eastern Peru and to *C. ferruginea* (Lam.) R. & S. of the northern Andes and Central America. It is readily recognized by its peculiar calyx. This, when not distorted by the enlarging fruit, is funnel-form or vase-shaped and is abruptly expanded from a short tube (ca. 1–1.5 mm. thick and 1–2 mm. long) or even from the narrow base. The calyx-tube is covered with numerous minute resinous granules. The ascending, more or less deltoid, lobes are somewhat strigose outside especially towards their apices.

The following vernacular names have been found on the labels of the specimens indicated. Black sage—*Anderson 553;* Waijanaka erepaloe—*B. W. 4621;* Baka Oema—*Tresling 232;* Blakka hoema—*B. W. 5123* and Makoeja pipá (Kar.), Kaboejakoro diamaroe (Arow.) and Blakka wintje (Nig. Eng.)—*B. W. 1035.*

23. **Cordia tomentosa** Lamarck ex Roemer & Schultes, Syst. **4**: 459 (1819). *Varronia tomentosa* Lamarck, Tab. Encyc. **1**: 419 (1791); Poiret, Encyc. **4**: 264 (1797); Desvaux, Jour. de Bot. **1**: 268 (1808). *Lithocardium tomentosum* (Lam.) Kuntze, Rev. Gen. **2**: 977 (1891). *Montjolya tomentosa* (Lam.) von Friesen, Bull. Soc. Bot. Genève sér. 2, **24**: 183 (1933). *Cordia Aubletii* DeCandolle, Prodr. **9**: 490 (1845). *Lithocardium Aubletii* (DC.) Kuntze, Rev. Gen. **2**: 976 (1891).

Shrub, 1–4 m. tall; stems clothed with a mixture of curved ascending coarse and slender hairs; leaves lanceolate to ovate-lanceolate or ovate, 7–15 cm. long, 2.5–7 cm. broad, base obtuse or somewhat rounded, apex acute or somewhat acuminate, margin irregularly dentate, upper surface dull, scabrous, with numerous stiff ascending bristles which arise from more or less bulbous bases, lower surfaces pallid, more or less tomentose with abundant fine short interlaced hairs; petioles 5–10 cm. long, decurrent 2–6 mm. on the subtended branchlet or peduncle; peduncles axillary, ascending, 2–10 cm. long; spike broadly clavate, very dense, 1.5–4 cm. long, at anthesis ca. 7 mm. thick, increasing to about twice that thickness in fruit; calyx densely hairy or tomentose with intermixed resinous granules, ca. 5 mm. long at anthesis, much accrescent in maturity, the tips of the lobes evidently free in the bud, calyx-lobes narrowly triangular, very elongate, acuminate; corolla white; fruit tightly invested by the calyx at maturity; stone ca. 4 mm. long.

Known only from French and Dutch Guiana.

DUTCH GUIANA: Voltz Mts., open formation, small shrub 2 m. tall, fl. white, Aug. 22, 1920, *Pulle 252* (Utr).

FRENCH GUIANA: Cayenne, open ground near Baduel, July 10, 1921, *Broadway 720* (G); Cayenne, shrub 4.5 m. tall, fl. white, Feb. 1859, *Sagot* (P); Cayenne, S. Marca savanna near Mt. Baduel, 1867, *Jelski* (BD); Cayenne, 1859, *Sagot 1315* (K, BM, P); Cayenne, *Martin* (K), *Leprieur* (K, Del, P) and *Aublet* (BM); indefinite, *Martin ex herb. Rudge* (BM); indefinite, *Poiteau* (K, BD, Del); indefinite, 1820, *Perrottet 211* (DC).

The present species is most closely related to *C. multispicata* Cham. of eastern Brazil, from which it differs in having the calyx coarsely strigose or tomentose all over, rather than nearly or quite glabrous. The type of *Varronia tomentosa* in the Lamarck Herbarium is labeled as coming from Jussieu and is devoid of any geographic data. It consists of a leaf and a fragment of inflorescence. These, however, evidently represent the much collected plant of the vicinity of Cayenne which is treated here.

There must remain some question as to the proper disposition of the name *Cordia Aubletii* DC. The plant actually described by DeCandolle is Perrottet (no. 211), which represents *C. tomentosa*. The reference by DeCandolle to "*Varronia Martinicensis* Aubl. guian. 232 non Jacq.", which might stand as the basis for the name chosen by him, is quite ambiguous. Aublet quoted a name and a descriptive phrase from Jacquin which apply to a West Indian species. The several lines of discussion by Aublet, concerning the fragrance of the herbage, the color of the fruit, the vernacular name and the local uses of the plant, in fact all the original data, all apply to *C. macrostachya* Jacq. Consequently if the name *C. Aubletii* is taken as founded upon the reference to Aublet's work, the species justly should become a synonym of *C. macrostachya*. I have preferred, however, to associate the name *C. Aubletii* with DeCandolle's specimen from Perrottet and the description of that specimen published in the Prodromus. It may be further noted that the specimen of *Hostmann 877,* which the younger DeCandolle, in a foot-note, cited as representing *C. Aubletii,* is in fact representative of *C. Schomburgkii.*

In the British Museum there is a collection of *C. tomentosa* made by Aublet. Among his manuscripts I have seen a good description of the species mentioned. It is possible that Aublet identified the plant as *Varronia globosa* and that the report of *V. globosa* in his book, l. c. **1**: 232 (1775), may be based upon his collection of *C. tomentosa.*

24. **Cordia multispicata** Chamisso, Linnaea **4**: 490 (1829); Fresenius in Martius, Fl. Bras. 8^1: 17, tab. 6 (1857); Johnston, Contr. Gray Herb. **92**: 29 (1930). *Lithocardium multispicatum* (Cham.) Kuntze, Rev. Gen. **2**: 977 (1891). *Cordia bahiensis* DeCandolle, Prodr. **9**: 489 (1845). *Varronia spicata* Salzmann ex DeCandolle, Prodr. **9**: 489 (1845), as synonym.

Shrub becoming subscandent, 1–3 m. tall; stems clothed with a mixture of curved ascending coarse and slender hairs; leaves ovate to ovate-lanceolate, 4–10 cm. long, 2.5–6 cm. broad, base obtuse to rounded, apex acute to somewhat acuminate, margin crenate or dentate, upper surface not lustrous, scabrous, bearing numerous coarse short ascending hairs from bulbous bases, lower surface pale, bearing slender soft curved hairs on the nervation; petioles slender, 4–10 mm. long, decurrent 2–5 mm. on the subtended peduncle or branchlet; peduncle axillary, 1–6 cm. long, ascending; spike broadly clavate to nearly subcylindrical, 1–7 cm. long, short and dense to rather loose and elongate, 7–10 mm. thick; calyx hairy on the lobes, the tube practically glabrous, bearing numerous resinous granules, tip of lobes short but free in the bud, lobes broadly triangular and short acuminate; calyx ca. 3 mm. long at anthesis, accrescent; corolla white, 4–5 mm. long; fruit ensheathed by the calyx at maturity; stone ca. 4 mm. long.

Brazilian, from the mouth of the Amazon southward to Rio Janeiro.

BRAZIL: beach at Prainha, Nov. 26, 1873, *Traill 561* (K).

This species which has been much collected about the mouth of the Amazon, particularly in the vicinity of Pará, is clearly related to *C. tomentosa* of French and Dutch Guiana. Collecting on the Brazilian coast north of the Amazon will no doubt reveal the presence of the species in that region and possibly may produce forms transitional to *C. tomentosa* as well. *Cordia multispicata* seems to differ from *C. tomentosa* chiefly in its calyx which tends to be entirely glabrous and evidently resinous-granulate below the shorter nearly deltoid lobes. In *C. tomen-*

tosa the calyx-lobes are distinctly more elongate, being narrowly triangular, and have more elongate tips. The calyx-tube in the Guianan plant is hairy all over. In fact, except for the free lobe-tips of the calyx, *C. multispicata* is more suggestive of *C. Schomburgkii* than of *C. tomentosa*.

DOUBTFUL AND EXCLUDED SPECIES

Cordia flavescens Aublet, Hist. Pl. Guian. Fr. **1:** 226, tab. 89 (1775); Poiret, Encyc. **7:** 43 (1806); Schomburgk, Fauna u. Fl. Brit. Guiana 960 (1848); Johnston, Contr. Gray Herb. **92:** 63 (1930). *Lithocardium flavescens* (Aubl.) Kuntze, Rev. Gen. **2:** 977 (1891). *Cordia sarmentosa* Lamarck, Tab. Encyc. **1:** 422 (1791). *Cordia echitioides* Lamarck ex Dietrich, Synop. **1:** 612 (1839), in synonymy. *Firensia* Scopoli, Intr. 157 (1777).

According to Aublet, l. c. 227, the original material of this species was collected on the Ile de Cayenne and on the adjacent mainland of French Guiana near Tonnegrande. The species is based upon mixed material consisting of (1) flowers of some species of *Cordia*, and (2) fruiting branches of *Ocotea commutata* Nees, of the Lauraceae. Since the species is based upon two entirely discordant elements it must be rejected under article 51 of the International Rules of Nomenclature. At the British Museum and at the museum in Stockholm there are specimens of this species collected by Aublet. These specimens represent only the *Ocotea*.

Cordia lutea Lamarck, Tab. Encyc. **1:** 421 (1791).

A specimen of this species in the Delessert Herbarium is labeled as collected in Cayenne by Perrottet. The species is known only from the semi-arid regions of western Peru and Ecuador and is not even to be expected from the wet Guianan coast. The data on the specimen at Geneva are obviously incorrect. I have had previous occasions to question the accuracy of the geographic data associated with the Perrottet collections in the Delessert Herbarium.

Cordia scandens Poiret, Dict. Sci. Nat. **10:** 410 (1818).

This species is given as collected by Martin in Cayenne. I have seen the fragmentary type in Poiret's herbarium and ample specimens of evidently the same collection in the General Herbarium, also at Paris. A search in the herbarium proved that this authentic material is referrable to *Dichapetalum vestitum* Baill., var. *scandens* [Benth.] Baillon in Martius, Fl. Bras. **12**^{1}**:** 372 (1886). The correct name for that plant, consequently, is **Dichapetalum scandens** (Poir.), comb. nov.

Cordia tetraphylla Aublet, Hist. Pl. Guian. Fr. **1:** 224, tab. 88 (1775); Poiret, Encyc. **7:** 42 (1806); Schomburgk, Fauna u. Fl. Brit.

Guian. 1151 (1848); Fresenius in Martius, Fl. Bras. **8**^{1}: 13 (1857); Pulle, Enum. Pl. Surinam 397 (1906); Johnston, Contr. Gray Herb. **92**: 64 (1930). *Lithocardium tetraphyllum* (Aubl.) Kuntze, Rev. Gen. **2**: 977 (1891). *Firensia lutea* Rafinesque, Sylva Tellur. 40 (1838).

Aublet, l. c. 226, states that this shrub is very common on the sand near Kourou and westward along the French Guiana coast to Sinnamary. The description given by Aublet is a mixture, based partly upon the flowers of some species of *Cordia* and partly upon a leafy fruiting branch of *Buchenavia capitata* (Vahl) Eichl. of the Combretaceae. The name based upon entirely discordant elements must be discarded.

Cordia Myxa sensu Schomburgk, Fauna u. Fl. Brit. Guiana 830 (1848).

Cordia curassavica sensu Schomburgk, Fauna u. Fl. Brit. Guiana 830 (1848).

Cordia martinicensis sensu Schomburgk, Fauna u. Fl. Brit. Guiana 830 (1848).

The three names above cited are listed by Schomburgk in his catalogue of the plants of British Guiana. The first two are given as cultivated. The last is given as growing wild on plantations and in ditches in the coastal region. I suspect that all three names represent misdeterminations.

2. **Lepidocordia** Ducke, Archiv. Jard. Bot. Rio Janeiro **4**: 170 (1925).

Large tree with broad leaves. Inflorescence a dichotomously branched corymbose panicle. Calyx 5-lobed, persistent. Corolla white, small, 5-merous, with short tube and spreading lobes. Stamens 5, short-exserted. Ovary 4-celled. Stigmas 2, conic, sessile on the apex of the ovary. Fruit unlobed, a drupe, breaking up into 2 flattened bony 2-seeded nutlets. Endosperm present. Cotyledons flat.

A monotype endemic to our area. Its immediate relationships are obscure.

1. **Lepidocordia punctata** Ducke, Archiv. Jard. Bot. Rio Janeiro **4**: 171, tab. 22 (1925); Sandwith, Kew Bull. **1933**: 335 (1933).

Tree 15–30 m. tall, trunk irregularly and very deeply fluted; leaves oblong-lanceolate, broadest at or above the middle, 1–2 dm. long, 2–7 cm. broad, with 6–9 pairs of veins, base obtuse to acute, apex acuminate, upper surface with inconspicuous short erect hairs on the veins and veinlets, minutely and abundantly white-pustulate, lower surface darker with ascending or appressed hairs on the principal veins, petiole 1–2 cm. long; inflorescence stiff, 5–10 cm. broad, flowers crowded at the ends of the branches, not scorpioid; calyx 2–3 mm. long at anthesis, in fruit twice as large and persistent, lobes lance-ovate, acuminate; corolla white, 2–2.5 mm. long, lobes ovate and about as long as the tube; filaments flattened, glabrous, ca. 1 mm. long, inserted in the middle of the corolla tube; anthers small; ovary glabrous; fruit erect, narrowly obovoid or ellipsoid, glabrous, lustrous, red, 5–7 mm. long, ca. 3 mm. thick.

BRITISH GUIANA: right bank of the Rewa River, ca. 14 miles SSE. of mouth, ca. 90 m. alt. tree 6 dm. in diameter, over 30 m. tall, trunk deeply fluted, growing in Malata (*Mimusops*) Forest on a low hill with red clayey soil, Oct. 7, 1931, *Forest Dept. Brit. Guiana, Field No. D91, record no. 2082* (K).

BRAZIL: Rio Branco de Obidos, northeast of Obidos in the forest called "Repartimento," State of Pará, non-flooded forest, medium-sized tree with fluted trunk, fl. white, Dec. 15, 1913, *Ducke, Jard. Bot. Rio Jan. no. 17864* & *Herb. Amaz. Mus. Pará no. 15152* (K, BD, isotypes); hills near the Rio Branquinho, a tributary of the Rio Branco de Obidos, large tree with trunk excavated and sulcate, fl. white, fruit red, Jan. 27, 1918, *Ducke, Jard. Bot. Rio Jan. no. 17863* & *Herb. Amaz. Mus. Pará no. 16958* (K, BD); forest on Rio Branco de Obidos, elevated place near mouth of Rio Branquinho, large tree with white flowers, Nov. 1, 1919, *Ducke, Jard. Bot. Rio Jan. no. 11406* (BD).

This remarkable tree is known only from the collections cited. Ducke found it on a minor tributary of the Amazon, just to the northeast of Obidos, State of Pará, Brazil. He has made several collections at this type-locality. Members of the Forest Service of British Guiana recently discovered a second locality on the Rewa (or Illiwa) River, between the Rupununi River and the upper Essequibo between 3° and 4° N. lat. This new station is about 650 km. east-northeast of the type-station near the Amazon, and separated from it by the basin of the Rio Trombetas and the headwaters of the Essequibo River. There is every reason to believe that *Lepidocordia* will be found in the intervening region when it is reasonably well explored.

3. **Tournefortia** Linnaeus, Gen. 68 (1754).

Shrubs or woody vines with broad leaves. Inflorescence consisting of scorpioid racemes or spikes borne in dichotomous panicles. Calyx persistent, usually 5-lobed. Corolla white or yellowish, small, usually 5-merous, with cylindrical tube and spreading limb. Stamens usually 5, borne on the corolla-tube, included; filaments short. Ovary 4-celled, style terminal and solitary. Stigma sessile or borne on a distinct style, peltate or conic, fertile on the sides, apex usually bifid. Fruit a drupe, lobed or unlobed at maturity breaking up into 2–4 bony nutlets. Nutlets 1–2-seeded, frequently with 1–2 empty cavities. Endosperm thin. Cotyledons flat.

A genus of about 100 variable and ill-defined species; widespread in the Tropics but evidently centering in America. Type Species, *T. hirsutissima* L.

KEY TO THE SPECIES

Fruit deeply 4-lobed; embryos curved; corolla-lobes linear or long acuminate. § *Cyphocyema.*

Corolla-tubes short, 1.5–2.3 mm. long, constricted at the throat, lobes linear, nearly as long as the tube; fruit white; plant very slender .... 1. *T. volubilis.*

Corolla-tube elongate, 3–8 mm. long, not constricted at throat; lobes broadened below middle, half length of tube or less; fruit yellowish.

Herbage sparsely and inconspicuously short-strigose or glabrous, even when young .... 2. *T. syringaefolia.*

Herbage evidently and usually abundantly hairy, especially when young .... 3. *T. paniculata.*

Fruit obscurely if at all lobed; embryos straight; corolla-lobes broad and rounded. § *Eutournefortia.*

Style well developed, 2–3 mm. long, evident even on the mature fruit; throat of corolla inflated; fruiting calyces frequently pedicellate .... 4. *T. Ulei.*

Style short, the stigma apparently sessile on the mature fruit; throat of corolla constricted; calyx sessile even in fruit.

Stems with pale short curving appressed hairs or glabrous; corolla-tube 4–5 mm. long .... 5. *T. bicolor.*

Stems with spreading brown or tawny bristles; corolla-tube 5–8 mm. long.

Leaves dull, with abundant long slender hairs; stems with abundant bristles 2–4 mm. long .... 6. *T. cuspidata.*

Leaves glossy, with only scattered hairs along the veins, practically glabrous; stems with only scattered short bristles 1–2 mm. long .... 7. *T. melanochaeta.*

1. **Tournefortia volubilis** Linnaeus, Sp. Pl. 140 (1753). *T. floribunda* sensu Schomburgk, Fauna u. Fl. Brit. Guian. 1084 (1848).

Slender vine, densely clothed with slender curved hairs; branchlets slender; leaves lanceolate to ovate-lanceolate, 2–10 cm. long, 1–5 cm. broad, base rounded or obtuse, apex acuminate, surface densely strigose or velvety-tomentose, pale or tawny; inflorescence very slender and loosely branched, the spikes becoming 2–10 cm. long; calyx 1–2 mm. long, weakly accrescent, lobes subulate, reaching to beyond middle of corolla-tube; corolla white, tube 1.5–2.3 mm. long, strigose, throat constricted, lobes linear, 1–2 mm. long, spreading; fruit white with black dots, 4-lobed, the lobes subglobose, breaking up into single-seeded nutlets; style developed.

Eastern British Guiana, Venezuela, Colombia and Ecuador, and northward in the West Indies and Central America.

BRAZIL: Roraima, 1842–3, *Schomburgk 732* (BM, P); indefinite, *Schomburgk 732/1110b* (K); indefinite, Jan. 1843, *Schomburgk 1110* (BD).

I believe that the three above cited specimens are parts of a single collection and the basis upon which Schomburgk, l. c. 1084, reported *T. floribunda* from the southern slopes of Roraima. Part of the south slope of Roraima belongs to Venezuela, and it is quite possible that Schomburgk's specimens may have come from within Venezuelan rather than Brazilian territory.

Schomburgk, op. cit. pg. 830, reports *T. volubilis* as occurring about abandoned plantations near the coast of British Guiana, and Aublet, Hist. Pl. Guian. Fr. **1**: 117 (1775), lists it as occurring in French Guiana. I have seen no specimens to substantiate either of these two records. I consider the accuracy of both records extremely questionable.

2. **Tournefortia syringaefolia** Vahl, Symb. **3**: 23 (1794). *Messerschmidia syringifolia* (Vahl) Roemer & Schules, Syst. **4**: 543 (1819); Don, Gen. Syst. **4**: 370 (1838). *T. peruviana* Poiret, Encyc. Suppl. **4**: 425 (1816); Urban, Symb. Ant. **4**: 524 (1910); Johnston, Contr. Gray Herb. **92**: 78 (1930). *T. surinamensis* A. DeCandolle, Prodr. **9**: 526 (1845); Schomburgk, Fauna u. Fl. Brit. Guian. 961 and 1151 (1848); Miquel, Stirp. Surinam. 138 (1850); Pulle, Enum. Pl. Surinam. 398 (1906). *T. Hostmanni* Klotzsch ex Schomburgk, Fauna u. Fl. Brit. Guian. 1151 (1848), nomen. *T. maculata* sensu Lamarck, Tab. Encyc. **1**: 416 (1791) and Poiret, Encyc. **5**: 357 (1804), as to plants in Herb. Lam. *T. laurifolia* sensu DeCandolle, Prodr. **9**: 522, adnot. (1845). *T. foetidissima* sensu De Vriese, Nederl. Kruidkund. Arch. **1**: 347 (1848).

Shrubby vine; branchlets inconspicuously short-pubescent; leaves ovate to lance-elliptic or broadly lanceolate, 4–10(–15) cm. long, 2–5(–8) cm. broad, base acute to rounded, apex acuminate, lower face paler than upper, both faces very sparsely and very inconspicuously short-strigose (even when immature), usually abundantly and very minutely tuberculate, petioles 7–15 mm. long; inflorescence slender, loosely branched, terminal, 5–15 cm. broad, spikes usually less than 5 cm. long even in fruit; calyx 1–1.5 mm. long, weakly accrescent, lobes subulate to ovate; pedicels 0–1 mm. long at anthesis, in fruit becoming 1–5 mm. long and usually much thickened; corolla greenish white, tube 3–4 or even 8 mm. long, limb 3–4 or even 5 mm. broad, lobes 1–1.3 or even 2.5 mm. long, spreading, broad below the middle and above coarsely long-acuminate; fruit yellow or yellowish, usually spotted with black, conspicuously 4-lobed, the lobes subglobose, breaking up into 4 single-seeded nutlets; style developed.

From northern Brazil and Peru northward into the West Indies and Central America.

British Guiana: Berbice, Jan. 1896, *Jenman 6925* (K).

Dutch Guiana: Plant. Jagtlust, 1913, *Soeprato 38E* (Utr); Para District, scandent shrub, corolla somewhat greenish white, April 1838, *Splitgerber 1159* (Leid, P); Brownsberg Summit, liana with greenish flowers, 1924, *B. W. 6650* (Utr); banks of lower Commewyne River, Dec. 1842, flowers greenish, *Focke 750* (Utr); indefinite, *Hostmann 289* (BD, type of *T. Hostmanni* Kl.; K, BM, P), *Hostmann 951* (Boiss, type of *T. surinamensis;* G, K, BM, Utr, BD, Deles, P), *Hostmann ed. Hohenacker 1721* (P), *Kappler 951* (P), *Kappler 1721* (Utr) and *Focke 180* (Leid).

French Guiana: Cayenne, *von Rohr* (Copenhagen, type of *T. syringaefolia,* BM, isotype); Cayenne, *Martin* (K); Cayenne, *Rudge* (BM); near Cayenne, Feb. 12, 1845, *Rothery 207* (K), *sine no.* (BM); Montabo, Cayenne, 1866, *Jelski* (BD).

I have seen the types of all the species listed above. Vahl's species evidently belongs here and is notable chiefly for having the leaf-blade ovate (in accord with its name) rather than lance-oblong as is usually common in this plant. The common form of the species in the Guianas and in northwestern South America is well exemplified by the types of *T. Hostmanni* and *T. surinamensis.* All the material from French Guiana, including the type of *T. syringaefolia,* has corolla-tubes a few millimeters longer than in other South American plants. Similar elongate corolla-tubes, however, are found in the West Indian plants that have been classified, along with all South American forms, as *T. peruviana.* Possibly the difference in corolla-length may merit some nomenclatorial recognition, particularly as both the Cayenne and West Indian forms with elongate corollas also tend to have more ample leaf-blades than the short-tubed plants.

3. **Tournefortia paniculata** Cham. var. **spigeliaeflora** (A. DC.), comb. nov. *Tournefortia spigeliaeflora* A. DeCandolle, Prodr. **9:** 525 (1845); Schomburgk, Fauna u. Fl. Brit. Guian. 1151 (1848); Johnston, Contr. Gray Herb. **92:** 81 (1930).

Similar to *T. syringaefolia* Vahl, differing only in the more abundant and usually more slender and tawny hairs on the herbage, particularly on the immature leaves.

About the margins of the Amazon Basin in southwestern British Guiana, Colombia and Peru; also in Costa Rica.

British Guiana: Rupununi near Pirara, Feb. 1842, *Schomburgk 669* (BD); Pirara, etc., *Schomburgk 427* (BM, Deles, P); near Pirara, 1838, *Schomburgk 749* (K, BM, Leid, BD, Deles; DC, type); indefinite, *Schomburgk 427/669b* (K).

The elusiveness and scarcity of characters separating the many recognizable species of *Tournefortia* are well exemplified by the case of *T. paniculata*. This plant, centering in Brazil and having a distribution generally to the south and east of its close relative, *T. syringaefolia,* is separated from its relative only by quantity of pubescence. This difference is usually very real and tangible. When not, it at least gives to the two forms a perceptible though almost intangible difference in aspect, which coupled with their distinctly natural and credible wide geographic range, leads one inevitably to the conviction that two large genetic entities are concerned. These two species would be united by a stern judge of species-behavior. In his treatment of *Tournefortia,* however, he would be forced to create specific aggregations so large as to be all inclusive and indefinite, or to assemble under his aggregates such an array of subspecific categories as to be cumbersome and impractical. Difficulties in defining and describing species are encountered repeatedly in *Tournefortia* and force the student of the genus to abandon rigid and preconceived notions concerning species values. Testing the subjective matters of plant aspect by the facts of geographic distribution, he must gropingly work out natural concepts of the incipient and unfortunately not yet sharply definable species. The test of the resulting classification of the species of *Tournefortia* is not the imposing number and decisiveness of the key-characters, but the objectivity of the concept judged by one studying masses of material of it and of the group to which it belongs. A study of material of *T. paniculata* and *T. syringaefolia* does justify these two concepts and, as in many other similar cases in *Tournefortia* (e. g. *T. hirsutissima* and *T. bicolor*), does lend support to the universal recognition of these weak but practicable concepts.

The present variety is that race of *T. paniculata,* with tawny somewhat shaggy pubescence, long corolla-tubes and long acuminate corolla-lobes, which occurs about the head-waters of the Amazon and is geographically separated from the typical form of *T. paniculata,* of eastern Brazil and Paraguay, by the great tracts of the Amazon Basin. It is a weak variety but certainly worthy of some recognition. The extreme form is well exemplified by the type-collection of *T. spigeliaeflora,* collected by Schomburgk and labeled as from Pirara. In Robert Schomburgk's notes at Kew the type-number (749) appears in a list of plants (nos. 701–769) sent out to the coast from Pirara on June 25, 1838. In this list only six numbers are provided with definite localities, these all being given as from Pirara. Richard Schomburgk in his published catalogue, l. c. 1151, lists *T. spigeliaeflora* only from the "vicinity of Pirara at the edge of the oasis." This locality is on the margin of the Rio Branco watershed.

4. **Tournefortia Ulei** Vaupel, Notizbl. Bot. Gart. Berlin **6:** 186 (1914); Johnston, Contr. Gray Herb. **92:** 70 (1930). *T. Miquelii* Macbride, Proc. Amer. Acad. **51:** 541 (1916). *T. syringaefolia* of most authors, e. g. Miquel, Stirp. Surinam. 137, tab. 41 (1850); Pulle, Enum. Pl. Surinam 398 (1906), excl. of *Splitgerber 841.*

Shrub or liana; branchlets puberulent; leaves rather thin, ovate or ovate-elliptic or rarely broadly lanceolate, 6–17 cm. long, 3–8 cm. broad, base obtuse, apex acuminate, surfaces glabrous except for inconspicuous puberulence on the veins beneath, frequently with numerous scattered minute usually pale tuberculations; inflorescence loosely branched, the racemes loosely flowered and becoming 2–10 cm. long; calyx 1.5–2 mm. long, weakly accrescent, with triangular or subulate lobes, sessile or shortly and distinctly pedicellate; corolla 7–8 mm. long, greenish white, tube 3–4 mm. long, throat 1–1.5 mm. long, inflated, limb 2–3 mm. broad, lobes ovate ca. 1 mm. long; fruit glabrous, 4–5 mm. thick, not quite so long, broadest below middle; style well developed, becoming 2–3 mm. long, usually persistent; stigma clavate.

Known from the Guianas and in the head-waters of the Amazon south to Bolivia.

British Guiana: Arawak Matope, Cuyuni River, Oct. 1904, *Bartlett 8333* (K); upper Demerara River, Sept. 1887, *Jenman 4117* (K, NY).

Dutch Guiana: Surinam River near Bergendal, *Focke 1308* (Utr, type of *T. Miquelii*); road near Brownsberg, 1910, *native collector 170* (Utr); Commewyne River, *Focke* (K); Surinam, *Focke 121* (Leid).

French Guiana: Maroni River near Apatou, Oct. 1901, *Went 458* (Utr); Ile Portal, Maroni River, May 1857, *Sagot 1011* (K, P); St. Jean, fl. greenish, May 18, 1914, *Benoist 1247* (P); Charvein, fl. green, Jan. 20, 1914, *Benoist 648* (P); Roura, 1858, *Sagot* (P); Cayenne, 1859, *Sagot* (P); indefinite, *Poiteau* (K, BD).

In the Guianas this plant has been generally misdetermined as *T. syringaefolia,* a name properly applicable to the very different plant that has been called *T. peruviana.* The first name for our very distinct species is *T. Ulei,* based upon material collected by Ule in extreme southwestern Brazil. The name *T. Miquelii* Macbr., is based upon a plate published by Miquel, l. c. Since this is evidently drawn from the specimen at Utrecht collected at Bergendal by Focke (no. 1308), that specimen may be considered as the type of *T. Miquelii.* It is quite like *T. Ulei.*

5. **Tournefortia bicolor** Swartz, Prodr. 40 (1788) and Fl. Ind. Occ. **1:** 344 (1797); Johnston, Contr. Gray Herb. **92:** 69 (1930). *T. laevigata* Lamarck, Tab. Encyc. **1:** 416 (1791); Fresenius in Martius, Fl. Bras. 8^1: 49 (1857). *T. laevigata* var. *latifolia* DeCandolle, Prodr.

9: 519 (1845); Schomburgk, Fauna u. Fl. Brit. Guian. 1151 (1848). *T. glabra* Aublet, Hist. Pl. Guian. Fr. **1:** 118 (1775), not Linn. (1753). *T. Aubletii* Macbride, Proc. Amer. Acad. **51:** 541 (1916).

Shrub 1–5 m. tall, becoming subscandent; branchlets with weak short usually sparse ascending appressed hairs, rarely glabrous or puberulent; leaves ovate to elliptic or lance-ovate, 5–14 cm. long, 3–9 cm. broad, subcoriaceous, base obtuse to rounded, apex acute, upper surface slightly lustrous, bearing a few scattered weak short appressed hairs, smooth or bearing very minute inconspicuous papillae, lower surface slightly more hairy than upper; petioles 5–15 mm. long; inflorescence dense, branched, 5–20 cm. broad, racemes becoming 1–4 cm. long; calyx sparsely strigose at anthesis with lobes lanceolate or ovate, 1–2.5 mm. long, weakly accrescent, usually sessile; corolla white, tube 4–5 mm. long, strigose outside, about twice length of calyx, limb 6–7 mm. broad; fruit white, very fleshy, ca. 8 mm. long, glabrous; stigma subsessile.

Widely distributed in the American Tropics.

BRITISH GUIANA: Barima River, 2.5–3.5 m. tall, fl. white, March 1923, *La Cruz 3372* and *3373* (G); Issorora, Aruka River, wet forest, tree 10 m., Jan. 1923, *Hitchcock 17560* (G, NY); Arawak Matope, Cuyuni River, fl. white, Oct. 1904, *Bartlett 8333* (K); near Pirara, Feb. 1842, *Schomburgk* (BD).

DUTCH GUIANA: Coppename River, fl. white Sept. 1901, *Boon 1112* (Utr); banks of Surinam River below Kabel, liana, fl. white, 1933, *Lanjouw 1231* (Utr); Brownsberg, tree no. 66, *B. W. 3243* (Utr); Brownsberg Summit, 1924, *B. W. 6513* and *6714* (Utr); Brownsberg, 1915, *B. W. 711* (Utr); Tapanahoni River, scandent shrub, fl. white, Oct., *Kappler ed. Hohenacker 2094* (BD); Maroni River, shrub 4–5 m., July 1904, *Versteeg 714* (Utr); indefinite, 1862, *Kappler 137* (Leid).

FRENCH GUIANA: La Mana, 1823–24, *Leschenault* (P); Cayenne, 1786–91, *von Rohr* (BM); indefinite, 1820, *Perrottet* (Deles).

5a. **Tournefortia bicolor** var. **calycosa** Donn. Smith, Bot. Gaz. **14:** 27 (1889); Johnston, Contr. Gray Herb. **92:** 70 (1930). *T. Schomburgkii* DeCandolle, Prodr. **9:** 517 (1845); Schomburgk, Fauna u. Fl. Brit. Guian. 961 (1848). *T. alba* Splitgerber ex DeVriese, Nederl. Kruidkund. Arch. **1:** 347 (1848); Schomburgk, Fauna u. Fl. Brit. Guian. 1151 (1848). (?) *T. coriacea* Vaupel, Bot. Jahrb. 54, Beibl. **119:** 3 (1916).

Calyx 3–4 mm. long, the lobes linear or lanceolate; plant tending to be slightly more pubescent than in the species.

Dutch and British Guiana and southwestward across the Amazon Basin to Peru and Ecuador; also in Guatemala and Honduras.

BRITISH GUIANA: Rockstone, bank of Essequibo, July 31, 1921, *Gleason 897* (NY, K); bank of Corantyne River, shrub 2.5–3 m. tall, Sept. 1878, *im Thurn* (K, P); Oreala, Corantyne River, trailing over bushes, Nov. 1879, *Jenman 120* (P); Epira, Corantyne River, trailing over bushes, Nov. 1879, *Jenman 65* (P); Berbice, 1837, *Schomburgk 70* (Deles); indefinite, *Schomburgk 70* (DC, TYPE of *T. Schomburgkii;* BM, Leid, BD, P); indefinite, ligneous twiner, fl. white, *Schomburgk 70* (K).

DUTCH GUIANA: Apoera Island, Corantyne River, fl. white, June 22, 1916, *B. W. 2043* (Utr); Wilhelmina Range, Peak no. 1200, June 9, 1926, *B. W. 7060* (Utr); near Plant. Catharina Sophia, Saramacca River, shrub 1–2.5 dm. high, in shade, fl. white, April 1838, *Splitgerber 841* (Leid, TYPE of *T. alba;* isotype, P).

BRAZIL: Rio Negro near confluence with Rio Solimöes, May 1851, *Spruce 1491* (G, K, BM).

The widely distributed "*T. bicolor* Sw." is reported by Schomburgk, l. c. 830, as cultivated as a decorative shrub in the coastal regions of British Guiana. *Tournefortia glabra* Aubl. is based entirely upon an unpublished plate by Plumier, (manuscripts at Paris vol. 6, tab. 53). This plate represents *T. bicolor* and is drawn from specimens obtained at Léogane in Haiti. The name *T. Aubletii* Macbr., is a mere renaming of *T. glabra* Aubl., because of an earlier Linnaean homonym. In a strict sense, therefore, both *T. glabra* Aubl. and *T. Aubletii* Macbr. are really West Indian plants.

The var. *calycosa* is based upon material from Guatemala. In Central America it appears to be rare and restricted to eastern Guatemala and adjacent Honduras where it is found in the same regions as *T. bicolor* and *T. hirsutissima.* In South America it occurs in the region to the east and south of the Orinoco Basin and hence far separated from *T. hirsutissima* L., which in South America is known only from northern Venezuela and Colombia. While the var. *calycosa* is not known to grow with *T. bicolor* in South America, it does occur in Ecuador, Peru and the Guianas where the species has been much collected. The variety seems to be a plant of more wet forests than those usually selected by *T. bicolor.* A study of *T. bicolor* from all parts of its very extensive range shows it to be remarkably uniform in the size of its calyx. The uniformly and evidently more elongate calyx-lobes of the var. *calycosa* merit some nomenclatorial recognition particularly since this variation seems to be geographically localized.

The variety has been frequently confused with *T. hirsutissima,* but that species may be readily distinguished from both *T. bicolor* and the var. *calycosa* by its more abundant, more spreading hairs on the herbage, and particularly by the stiff erect or ascending hairs (usually from a somewhat bulbose base) that according to abundance give a hirsute to velvety covering to the upper surfaces of the leaves. The fruit in *T. hirsutissima,* furthermore, is usually hairy. In *T. bicolor* and variety the somewhat glossy upper leaf-surfaces have weak scattered and commonly inconspicuous appressed hairs. The fruit is glabrous. The stems are usually sparsely hairy or glabrous. The calyx of *T. hirsutissima* is very variable in length. It may be short to elongate in the various parts of the range of the species. The two species, *T. bicolor* and *T. hirsutissima,* are very closely related and the differences separating them are almost exclusively those of pubescence mentioned. The difference seems to be decisive, however, and the resulting concepts natural and practicable.

The type of *T. alba* is the common form of the var. *calycosa,* it has the pubescence, particularly on the stems, sparse and scarcely, if at all, more abundant than is commonly found in *T. bicolor.* The type of *T. Schomburgkii* agrees with other collections from British Guiana in having conspicuously and rather densely hairy stems. In this regard it tends to suggest *T. hirsutissima* with which it has been confused. Schomburgk's original collection of *T. Schomburgkii* (no. 70), was distributed labeled as from "British Guiana" or from Berbice. In his catalogue, l. c. 961, he states that it grows on the banks of the Essequibo and makes no mention of Berbice. In closing it may be added that the type of *T. alba, Splitgerber 841,* was incorrectly cited under *T. syringaefolia* (equals *T. Ulei*) by Pulle, Enum. Pl. Surinam 398 (1906).

6. **Tournefortia cuspidata** Humboldt, Bonpland & Kunth, Nov. Gen. et Sp. **3:** 83 (1818). *T. obscura* A. DeCandolle, Prodr. **9:** 517 (1845); Schomburgk, Fauna u. Fl. Brit. Guian. 961 (1848); Fresenius in Martius, Fl. Bras. **8**^{1}**:** 49, adnot. (1857); Johnston, Contr. Gray Herb. **92:** 68 (1930). *T. setifera* Urban & Ekman, Ark. Bot. **22**A, no. **17:** pg. 94 (1929). *T. hirsutissima* sensu Pulle, Enum. Pl. Surinam 398 (1906).

Shrub or liana; branchlets pubescent, also conspicuously shaggy with abundant slender spreading brown hairs 2–4 mm. long; leaves lance-ovate to lanceolate, 7–15 cm. long, 3–6 cm. broad, base rounded or obtuse, apex acuminate, both surfaces with abundant appressed slender elongate hairs; petioles 5–13 mm. long; inflorescence stiffly and loosely branched, the spikes becoming 1–3 cm. long and crowded at the ends of the elongate branches; calyx-lobes subulate or linear, 7–9 mm. long at anthesis, weakly accrescent, sparsely long-hairy and short-strigose; corolla white, tube 5–8 mm. long, densely strigose outside, limb 4–6 mm. broad, lobes broad; fruit white, fleshy, compressed ovoid, probably ca. 8 mm. long, glabrous, more or less verrucose; stigma sessile.

Northern South America (Dutch Guiana to Colombia) and southward, in the upper reaches of the Amazon Basin, to Bolivia, doubtfully from eastern Brazil; Central America; West Indies.

British Guiana: Barima, March 1896, *Jenman 7118* (K); banks of the Quitaro, 1837, *Schomburgk 571* (DC, type of *T. obscura;* G, K, BM, Leid, BD); Berbice, June 1889, *Waby ex Jenman 5157* (K, BM); Berbice, *Burmann* (Deles); Demerara, *Parker* (K).

Dutch Guiana: Matappi, Corantyne River, liana, fl. white, June 18, 1916, *B. W. 2168* (Utr); Brownsberg Summit, liana, fl. white, July 3, 1924, *B. W. 6570* (Utr); Goddo, upper Surinam River, Jan. 29, 1926, *Stahel 134* (Utr); Pikien River, fl. white, July 1908, *Tresling 203* (Utr); Maroni River near Armina Falls, small shrub, fl. white, 1933, *Lanjouw 526* (Utr); indefinite, *Hostmann 227* (K, BM, Utr, BD, Deles, P).

I have examined the types of the species above cited. They are evidently conspecific! The type of *T. obscura* is *Schomburgk 571,* labeled as from the banks of the Quitaro. The specimen was collected by Robert Schomburgk. A study of his manuscript list at Kew shows that no. 571 falls within the gamut (no. 511–588) of numbered collections sent out from Curassawaka (on the Essequibo) in Dec. 1837. According to the list these numbers apply to specimens from "the Quitaro in November and to a few on the River Rewa, but the greater part of the high numbers from the mountains of Attarypou [Kanuku Mts.]." Only one number is provided with a definite locality, no. 581 being given as from the "mountains of Attarypou." The list gives the following field-notes for no. 571, "A ligneous twiner growing by river side, leaves light-green, a shade lighter below, calyx light green, petals and organs of fructification pure white, fruit a white berry." In Richard Schomburgk's published catalogue, l. c. 961, *T. obscura* is reported from the banks of the Rupununi, Rewa and Quitaro rivers.

In my paper on the Brazilian species of *Tournefortia* I reported this species, sub *T. obscura,* doubtfully from eastern Brazil. At Paris I have since seen a collection by Glaziou (no. 9981) labeled as from "São João da Barra" on Feb. 8, 1876. This locality is at the mouth of the Parahyba River in the northeastern section of the State of Rio Janeiro. The same number is cited by Glaziou, Bull. Soc. Bot. France **57,** Mem. **3e:** 478 (1910), under the name *"T. Salzmanni"* and as from "São João, près Campos." At Kew this collection by Glaziou, no. 9981, is labeled as cultivated at Rio Janeiro. The species has evidently been collected in eastern Brazil but whether or not from cultivated plants is still to be settled.

7. **Tournefortia melanochaeta** DeCandolle, Prodr. **9:** 520 (1845).

Shrub or liana; branchlets with scattered spreading brown hairs 1–2 mm. long; leaves lance-ovate, 9–11 cm. long, 5–6 cm. broad, base obtuse to rounded, apex acuminate, both surfaces lustrous and glabrous except for a very few slender appressed hairs along the midrib and veins, petioles 10–13 mm. long; inflorescence stiffly and loosely branched, spikes becoming 10–15 mm. long and crowded at the ends of the elongate branches; calyx-lobes glabrous, lanceolate to linear, 4–7 mm. long, weakly accrescent; corolla white, tube 5–7 mm. long, densely strigose outside, limb 4–5 mm. broad, lobes broad; stigma sessile; fruit unknown but probably as in *T. cuspidata.*

Known only from French Guiana.

FRENCH GUIANA: "Cayenne ou Guyane française," *Museum de Paris, 1821* (DC, TYPE); Cayenne (*Martin*) ex Museo Horti Paris, 1819 (BD); Cayenne, *Martin* (G, P).

The material cited is evidently all part of one large collection by Martin. It seems to be scarcely more than a glabrescent phase of *T. cuspidata,* a species which extends, from the westward, to the borders of French Guiana, though it is not as yet known to have been collected within that colony.

DOUBTFUL AND EXCLUDED SPECIES

Tournefortia gnaphalodes (Linn.) R. Brown ex Roemer & Schultes, Syst. **4**: 538 (1819).

Schomburgk, Fauna u. Fl. Brit. Guian. 830 (1848), reports this plant from the coasts of British Guiana, while Lamarck, Encyc. **3**: 94 (1789), and Aublet, Hist. Pl. Guian. Fr. **1**: 117 (1775) under the name *Heliotropium gnaphalodes,* indicate its occurrence in French Guiana. The plant is widely distributed in the West Indies but does not reach south to Trinidad. I have seen no material of it from the Guianan coast and, furthermore, do not believe that it is native in the region.

Tournefortia foetidissima Linnaeus, Sp. Pl. 140 (1753).

Tournefortia hirsutissima Linnaeus, Sp. Pl. 140 (1753).

Tournefortia cymosa Linnaeus, Sp. Pl. ed. 2, 202 (1762).

The above three species are listed by Aublet, Hist. Pl. Guian. Fr. **1**: 117–118 (1775), as occurring in French Guiana. They are West Indian species not known from the Guianas and, furthermore, not to be expected there.

Tournefortia incana (Meyer) Don, Gen. Syst. **4**: 368 (1838), not Lamarck (1791).

Tournefortia Meyeri DeCandolle, Prodr. **9**: 530 (1845).

The above two names are based upon *Messerschmidia incana* Meyer from the mouth of the Essequibo. The plant seems to be a species of *Heliotropium.*

4. **Heliotropium** [Tournef.] Linnaeus, Gen. 63 (1754).

Mostly low herbaceous or suffrutescent plants, rarely shrubs; leaves small to large. Inflorescence of solitary, geminate or ternate scorpioid spikes or racemes or the flowers solitary cauline and internodal. Calyx persistent or deciduous, with 5 teeth or lobes. Corolla yellow, white or blue, small, 5-merous, tube cylindrical, limb spreading. Stamens 5, borne in the corolla-tube, included, filaments short. Ovary 4-celled; style terminal, solitary; stigma sessile or on a distinct style, peltate or conic, fertile on the side, apex bearing a conic or cylindrical sterile appendage that is usually bifid or bidentate. Fruit dry, lobed or unlobed, at maturity breaking up into 2–4 bony nutlets. Nutlets 1–2-seeded, frequently with 1–2 sterile cavities. Endosperm developed.

A large genus widely distributed in the warmer regions of the world. Type Species, *H. europaeum* L.

KEY TO THE SPECIES

Plant distinctly succulent, entirely glabrous, frequently somewhat glaucous ....1. *H. curassavicum.*

Plant not succulent, more or less pubescent, not glaucous.

Flowers borne singly along the leafy stems; fruit contracted into a conic apex ....2. *H. lagoense.*

Flowers borne in well developed scorpioid spikes or racemes.

Corolla blue or purple; fruit glabrous, ribbed, angulate, deeply 2-lobed with the lobes horizontally divergent; plant coarse, erect, more or less hirsute with large evidently veined leaves 3–10 cm. broad ....3. *H. indicum.*

Corolla white; fruit strigose, rounded, weakly 4-lobed vertically; plant rather slender, erect or decumbent; leaves with appressed pubescence, very obscurely veined, less than 2 cm. broad.

Leaf-blades elliptic to broadly oblanceolate, 5–20 mm. broad, petiole 4–15 mm. long; racemes mostly geminate or ternate, bractless ....4. *H. procumbens.*

Leaf-blades linear to oblanceolate, 1–8 mm. broad, petiole 1–2 mm. long; racemes always single, bearing small lanceolate bracts 1–2 mm. long.

Corolla 4–6 mm. long, anthers joined at their apices; stigma borne on a short but evident style; stems comparatively coarse and stiff; leaves drying rather light colored ....5. *H. ternatum.*

Corolla 2–2.5 mm. long, anthers not joined apically; stigma sessile on the fruit; stems wiry, very slender, leaves usually drying dark colored......6. *H. filiforme.*

1. **Heliotropium curassavicum** Linnaeus, Sp. Pl. **1:** 130 (1753); Schomburgk, Fauna u. Fl. Brit. Guian. 961 (1848); Johnston, Contr. Gray Herb. **81:** 14 (1928).

Annual or short-lived perennial, succulent, glabrous; stems prostrate or decumbent, 1–3 dm. long, ascendingly branched; leaves narrowly to broadly oblanceolate, 2–4 cm. long, 3–10 mm. broad, fleshy, frequently somewhat glaucous; flowers borne in bractless single or geminate scorpioid spikes 1–10 cm. long; calyx ca. 1.5 mm. long at anthesis, over 2 mm. long at maturity, sessile or subsessile, lobes broadly cuneate to triangular-ovate; corolla white, 2–3 mm. long, lobes ca. 1 mm. long, tube shorter than calyx; anthers 0.6–1 mm. long, sagittate, apex with acuminate appendage, not joined together; fruit weakly 4-lobed, epicarp slightly fleshy and wrinkled in drying; style sessile, disk of stigma broad; nutlets 4, equal, oblong, 2–2.5 mm. long, 1-celled, 1-seeded.

From the coast of British Guiana, Venezuela and Colombia southward along the west coast of South America to central Chile and Patagonia, and northward through the West Indies and in Central America to southern-most United States.

British Guiana: Georgetown, *Hitchcock 16572* (G, NY); indefinite, seashore, June, 1889, *Jenman 5471* (US, BM); indefinite, *Jenman 2165* and *4466* (NY).

The species is listed as occurring in French Guiana by Aublet, Hist. Pl. Guian. Fr. **1**: 117 (1775). I consider this record very questionable. It may be noted that I have examined and made dissections of the type of *H. Lehmannianum* Bruns, Mitt. Inst. Allg. Bot. Hamburg, **8**: 69, fig. 10 (1929), recently described from the coast of southern Peru. My study has shown the type to be quite ordinary *H. curassavicum*. Bruns described and illustrated remarkable developments in corolla-lobing and in anther-shape. In the various dissections made on the type I could find no suggestion of remarkable structures, the corolla and the anthers agreeing perfectly with the familiar typical West Indian *H. curassavicum*.

2. **Heliotropium lagoense** (Warm.) Gürke in Engler & Prantl, Nat. Pflanzenf. IV. Abt. **3a**: 97 (1893); Johnston, Contr. Gray Herb. **81**: 49 (1928). *Schleidenia lagoensis* Warming, Kjoeb. Vidensk. Meddel. **1867**: 15 (1868). *Heliotropium trinitense* Urban, Symb. Ant. **7**: 350 (1912).

Annual herb with scattered slender appressed hairs; stems slender, prostrate, 5–30 cm. long, ascendingly branched; leaves oblanceolate, 0.5–1.5 cm. long; flowers borne singly along the leafy stems, extra-axillary; calyx of 5 unequal lanceolate or cuneate lobes, at anthesis 1.5–2 mm. long, becoming about twice as long in fruit; pedicels 1–3 mm. long, ascending; corolla white, 3–4 mm. long, funnelform; lobes ovate, 1–1.5 mm. long; sinus rounded, plaited, occasionally with a minute lobule; anthers oblong, bearing an obese hairy apical appendage nearly as large as the anther proper, anthers joined together by their appendages; fruit glabrous or nearly so, subterete, base rounded, from at or below middle contracted upwardly into a broad conic or short-rostrate apex; nutlets 4, ca. 1.5–2 mm. long, single seeded.

Northern Dutch Guiana, Trinidad, northern Venezuela, eastern Bolivia, and eastern and western Brazil; not common and apparently local and erratic in distribution.

DUTCH GUIANA: "Suriname," Jan. 1885, *Suringar* (Leid).

This species is frequently confused with *H. filiforme,* which it resembles in its wiry stems and slender leaves, but it is readily distinguished from that plant by its conic fruit and its cauline internodal flowers. Although Suringar's collection has no definite locality it is to be supposed that it is from the vicinity of Paramaribo where Suringar is known to have done most of his collecting in Dutch Guiana.

3. **Heliotropium indicum** Linnaeus, Sp. Pl. 130 (1753); Aublet, Hist. Pl. Guian. Fr. **1**: 117 (1775); Pulle, Enum. Pl. Surinam 399 (1906); Johnston, Contr. Gray Herb. **81**: 19 (1928). *Heliophytum indicum* (Linn.) DeCandolle, Prodr. **9**: 556 (1845); Schomburgk, Fauna u. Fl. Brit. Guian. 831 and 961 (1848).

An erect coarse weedy annual herb, usually more or less pale-hirsute, 1–10 dm. tall, mostly branched above the middle; leaves ovate or elliptic to broadly lanceolate, herbaceous, veined, 5–15 cm. long, 3–10 cm. broad, margin repand or undulate, apex acute, base obliquely acute to subcordate, petioles 4–10 cm. long, winged just below the leaf-blade; flowers borne in bractless single scorpioid spikes becoming 5–30 cm. long; calyx with subulate or cuneate lobes 2–2.5 mm. long, somewhat accrescent in fruit; corolla blue or violet or exceptionally white, salverform, tube 2.5–4.5 mm. long, evidently surpassing the calyx, limb 2–4 mm. broad; anthers elongate, the apices not united; style short and slender; fruit glabrous, strongly ribbed, deeply 2-lobed (the lobes spreading) and breaking up into 4 angulate nutlets 2–3 mm. long.

A Pan-Tropic weed, probably of American origin.

BRITISH GUIANA: Comaca, Moruka River, *La Cruz 1058* (NY, US); Waranuri Mission, Moruka River, Oct. 1922, *La Cruz 2600* (G, NY, US); Kamakusa, upper Mazaruni River, Nov. 1922, *La Cruz 2748* (G, NY); Tumatumari, *Gleason 370* (NY); Hyde Park, east bank of Demerara River, *Dahlgren* (FM); Demerara, *Parker* (K); Georgetown, weed along canal, fl. white, 1919, *Hitchcock 16684* (G, NY, US); Epira, banks of Corantyne River, Nov. 1879, *Jenman 54* (K); Corantyne River, Oct. 1879, *im Thurn* (P); indefinite, *Schomburgk 206* (BD) and *600* (K).

DUTCH GUIANA: bank of Corantyne River, 1911, *Hulk 33* (Utr); sand near Maripaston, Saramacca River, Nov. 1902, *Pulle 4* (Utr); Paramaribo, fl. bluish, *Kuyper 25* (Utr); near Paramaribo, fl. blue, Dec. 1837, *Splitgerber 338* (Leid, P); Combee, Paramaribo, Aug. 1901, *Went 319* and *332* (Utr); Plant. Rust en Werk, 1913, *Soeprato 57* (Utr); upper Surinam River near Saida, 1908, *Tresling 346* (Utr); Plant. Slootwijk, Commewyne River, 1913, *Soeprato 15J* (Utr); beach facing Cottica Mt., Lawa River, fl. white with yellowish throat, light lilac when young, Oct. 1903, *Versteeg 289* (Utr); Cottica River near Moengo, marshy ground, fl. light blue, 1933, *Lanjouw 403* (Utr); indefinite, *Focke 1370* (Utr).

FRENCH GUIANA: Maroni, *Wachenheim 287* and *290* (P), *291* (BM); St. Jean, fl. pale blue, April 26, 1914, *Benoist* (P); St. Jean, fl. pale blue with yellowish center, March 8, 1914, *Benoist 1154* (P); St. Laurent du Maroni, Jan. 1908, attractive to butterflies, *LeMoult* (P); Acarouani 1855, about dwellings, fl. bluish, *Sagot 449* (P); vicinity of Cayenne, fl. purple, May 6, 1921, *Broadway 118* (K); Cayenne, Feb. 18, 1845, *Rothery 165* (BD); Iles du Salut, 1854, fl. pale bluish, *Sagot 449* (BM, P).

BRAZIL: Obidos, *Spruce 476* (K); Monte Alegre, 1873, *Traill* (K).

VENEZUELA: Ciudad Bolivar, 1931, *Holt & Blake 838* (G); Las Batillas, *Passarge & Selwyn 301* (BD); Puerto Ayacucho, 1931, *Holt & Blake 834* (G).

In Dutch Guiana this species is called "Kaha Kankay" (*Tresling no. 346*) and "Kokorrode" (*Pulle no. 4*) and is given as being used with salt as a cure for gas on the stomach (*Versteeg no. 289*). According to Aublet, l. c., it is called "Cret-de-Coq" in French Guiana and an infusion of the flowers used "pour arrêter les pertes de sang chez les femmes."

4. **Heliotropium procumbens** Miller, Dict. ed. 8, no. 10 (1768); Johnston, Contr. Gray Herb. **81**: 52 (1928). *Heliotropium inundatum* Swartz, Prodr. 40 (1788).

Annual herb with more or less abundant slender appressed hairs, plant usually cinereous; stems erect or decumbent, 1–5 dm. long, ascendingly branched; leaves with elliptic, obovate or broadly oblanceolate blades, 1–4 cm. long, 5–20 mm. broad, petioles slender 4–15 mm. long; flowers borne in slender scorpioid racemes, racemes mostly geminate or ternate, bractless, elongating, becoming 2–10 cm. long, peduncles 1–4 cm. long; calyx with 5 unequal lanceolate or linear lobes, at anthesis 0.5–1 mm. long, becoming 1–2.5 mm. long in fruit, pedicels ca. 0.5 mm. long; corolla white 1–5 mm. long, lobes ovate, short, with rounded sinus; anthers ovate, contracted apically into short narrow appendages, anthers not joined apically; fruit depressed globose, 4-lobed, strigose; stigma sessile; nutlets strigose, 0.5–1 mm. long.

Northern Argentina northward through Tropical America to southern United States; rare in the very wet regions.

BRITISH GUIANA: indefinite: *Appun 1762* (K), *Schomburgk 1024* (K, BD) and *1026* (K).

BRAZIL: Prainha, *Traill* (K); Alemquer, *Spruce* (K).

5. **Heliotropium ternatum** Vahl, Symb. Bot. **3:** 21 (1794); Johnston, Contr. Gray Herb. **81:** 69 (1928). *Heliophytum passerinoides* Klotzsch ex Schomburgk, Fauna u. Fl. Brit. Guian. 1152 (1848), nomen. *Schleidenia Fumana* Fresenius in Martius, Fl. Bras. 8^1: 40 (1857). *Heliotropium Fumana* (Fresen.) Gürke in Engler & Prantl, Nat. Pflanzenf. IV. Abt. **3a:** 97 (1893); Johnston, Contr. Gray Herb. **81:** 71 (1928). *Heliotropium* sp., Oliver, Trans. Linn. Soc. London, Bot. **2:** 279 (1887). *Heliotropium strictissimum* sensu N. E. Brown, Trans. Linn. Soc. London, Bot. **6:** 51 (1901). *Heliotropium fruticosum* of authors, not Linnaeus.

Suffrutescent, with abundant ascending or appressed hairs; stems erect or decumbent, 1–5 dm. long, ascending branched; leaves lanceolate to linear, revolute, 1–3 cm. long, 1–8 mm. broad, with slender petiole 1–2 mm. long; flowers borne in stiff scorpioid racemes; racemes single, elongating and becoming 2–15 cm. long, bearing scattered lanceolate bracts 2–3 mm. long; calyx at anthesis 2–3 mm. long, consisting of 5 more or less unequal lanceolate lobes, becoming twice as large in maturity; pedicels 0.5–1 mm. long; corolla white, 4–6 mm. long, lobes ovate, sinus rounded and plicate; anthers ovate with short obtuse hairy apical appendages which are apically joined to one another; fruit depressed globose, 4-lobed, strigose; style short but evident; nutlets 1–1.5 mm. long.

Central America and the West Indies, northern Colombia and Venezuela, southern British Guiana and eastern Brazil; chiefly in open places or in dry thickets.

BRITISH GUIANA: Kamakot, Ireng River, 1884–85, *Jenman 3* (US); Konkarmo, Ireng Valley, Nov. 16, 1884, *im Thurn 3* (K, BM); Ireng Valley, *Quelch & McConnell 220* (K, BM) and *302* (K); Rupununi, *Appun 2203* (K); Rupununi, May 1842, *Schomburgk 573* (BD, TYPE of *H. passerinoides*); Pirara, etc., 1841–42, *Schomburgk 282* (P); indefinite, gravelly savanna, leaves appear farinaceous, fl. white, 1836, *Schomburgk* (K).

In and about the West Indies *H. ternatum* is generally recognized as a variable species in habit, pubescence and leaf-shape. The typical and most common form of it has loosely revolute leaves 3–5 mm. broad and a loosely appressed indument of slender hairs. This plant appears to be rare or absent in our area. In the Guianas the species seems to be represented only by a form found in the savannas near the Brazilian border. This has linear leaves 1–3 mm. broad and is silky strigose. It is quite like plants from eastern Brazil that have been described as *H. Fumana*. In my monograph, l. c. **81:** 69–71 (1928), *H. Fumana* was treated as doubtfully distinct from *H. ternatum*. Subsequent consideration of its relation with *H. ternatum*, in the light of new material, has led me to the belief that it is only a pronounced form, possibly a savanna-ecad of that species. Much of the material from the dry eastern corner of Brazil, which formerly I placed in *H. Fumana* (and even some that I placed in *H. salicoides* Cham.) I now refer unhesitatingly to *H. ternatum*. Only the material with narrow sublinear leaves and distinctly silky strigose indument should be placed under *H. Fumana*. This form comes from more interior, more moist localities than those in which *H. ternatum* is usually found. Transitional forms are common. If the linear-leaved, silky-strigose form of the savannas needs to be recognized, it may be called **Heliotropium ternatum** var. **Fumana** (Fresen.), comb. nov.

Both *H. ternatum* and the variety may be distinguished from *H. salicoides* by having white rather than bright yellow corollas. The leaves also dry much lighter in color in *H. ternatum* and the pubescence of the herbage is not so strongly spreading and so coarse as in *H. salicoides*. Warming's *Schleidenia subracemosa*, which I placed under *H. salicoides*, I now refer to *H. ternatum*. *Schleidenia dasycarpa* Fresen. is also based upon material referable to *H. ternatum*. I have recently examined the types of these Brazilian species.

The only Guianan specimen of this species at Berlin that was collected by Schomburgk (no. 573) is labeled as from the Rupununi. It bears Klotzsch's name, *Heliophytum passerinoides*, and is evidently the type of that undescribed species. Schomburgk, in his published list, however, gives *H. passerinoides* Kl. only from the savannas near the Takutu River. That stream joins the Ireng not far west of Pirara which in its turn is even a shorter distance west of the Rupununi. All of Schomburgk's specimens, under their various labels, probably came from the general region to the west of Pirara. From this region *H. ternatum* var. *Fumana* extends up the Ireng where others have collected it.

The typical form of the species is either very rare or absent in the coastal region of the Guianas. Possibly the region is too wet. The description of the puzzling *Messerschmidia incana* Meyer, from the mouth of the Essequibo, suggests *H. ternatum* in all except the fruit. The doubt surrounding Meyer's plant, however, forces me to leave it unplaced.

6. **Heliotropium filiforme** Lehmann, Götting. Gel. Anzeigen **1817**: 1515 (1817) and Asperif. **1**: 37 (1818); DeCandolle, Prodr. **9**: 545 (1845); Pulle, Enum. Pl. Surinam 399 (1906); Johnston, Contr. Gray Herb. **81**: 61 (1928). *Schleidenia filiformis* (Lehm.) Fresenius in Mar-

tius, Fl. Bras. **8**^{1}: 40 (1857). *Heliotropium helophilum* Martius, Flora Regensb. **21**^{2}, Beibl. **4**: 85 (1838) and Herb. Fl. Bras. p. 165, no. 267 (1841); DeCandolle, Prodr. **9**: 544 (1845); Schomburgk, Fauna u. Fl. Brit. Guian. 961 (1848); Miquel, Stirp. Surinam. 136, tab. 40 (1850).

Annual herb, sparingly strigose; stems slender, erect or decumbent, 1–4 dm. long, ascendingly branched; leaves 1–2.5 cm. long, 1.5–3.5 mm. broad, oblanceolate, petiole very slender, 1–2 mm. long; inflorescence consisting of very slender scorpioid racemes, these solitary, elongating, becoming 2–15 cm. long, bearing minute scattered lanceolate bracts, 1–2 mm. long; flowers 1–3 mm. distant, strict, numerous; calyx of 5 unequal lanceolate or lance-ovate lobes, at anthesis 1.5–2 mm. long, becoming about twice as long in fruit, pedicels becoming 0.5–1 mm. long in fruit; corolla white, funnelform, 2–2.5 mm. long; lobes ovate with broad open sinus, ca. 1 mm. long; anthers each contracted into a short puberulent apical appendage, not coherent; fruit depressed globose, obscurely 4-lobed, strigose; stigma sessile or subsessile; nutlets almost 1 mm. long.

Eastern Bolivia and Paraguay northward through Brazil to Venezuela and the Guianas; also in Trinidad and British Honduras; growing in sand, usually near water.

British Guiana: Essequibo River, Demerara, 1881, *Jenman 1095* (K, P); Essequibo, Jan. 1842, *Schomburgk 321* (BD); upper Rupununi, *Appun 2394* (K); Pirara, 1845, *Schomburgk 228* (BD, P); Berbice, sandy soil, 1837, *Schomburgk 351* (K, BD, P); indefinite, *Schomburgk 228/321b* (K).

Dutch Guiana: Corantyne River, sandy places near Wonotobo, 1916, *B. W. 2866* (Utr); Avanavero Rapids, Kabalebo River, in sand, 1920, *B. W. 4653* (Utr); island in Lucie River, sandy soil, 1910, *Hulk 398* (Utr); lower Saramacca River, in sand, Nov. 1902, *Pulle 69* (Utr); lower Surinam River, April 1846, *Kappler, ed. Hohenacker 1810* (Utr, BD); Maroni River, rocks at Armina Falls, 1901, *Went 467* (Utr); Maroni River near Bonnidoro, in sand, fl. white, *Kappler, ed. Hohenacker 2095* (BD); Lawa River, sandy flat, Oct. 1903, *Versteeg 277* (Utr); indefinite, 1862, *Kappler 158* (Leid).

French Guiana: Maroni, 1862, *Rech* (P); Cayenne, *Martin* (P); Cayenne, 1853, *Rothery 209* (Cambr.); Oyapock, Oct. 1844, *collector not given, no. 269* (K).

Brazil: Monte Alegre, *Traill 570* (K); middle Rio Cuminá, Dec. 24, 1928, *Sampaio 5906* (BD); Rio Cuminá, Cataract of Tronca, Sept. 18, 1928, *Sampaio 5011* (BD); Rio Trombetas, Lag. Caypurú, *Traill 568* (K); Barra Rio Negro, *Spruce 1115* (G, K).

Venezuela: Angostura, 1864, *Grosoudy* (P); Puerto de Tablas, Canton de Upata, 1864, *Grosoudy* (P); Tigrito, *Passarge & Selwyn 515* (BD); Las Botillas, *Passarge & Selwyn 302* (BD).

DOUBTFUL AND EXCLUDED SPECIES

Heliotropium fruticosum L. ex Aublet, Hist. Pl. Guian. Fr. **1**: 117 (1775).

Although listed by Aublet I believe that this species does not occur in French Guiana. The binomial was applied to *H. ternatum* in many of the older books. But neither this latter species nor the one properly called *H. fruticosum* is known or even to be expected in French Guiana.

Heliotropium latifolium Willd. ex Schomburgk, Fauna u. Fl. Brit. Guian. 961 (1848).

Listed by Schomburgk as distributed through the forests in the northern parts of British Guiana. The species (and the cited synonym, *H. scorpioides* HBK.) is a synonym of *H. angiospermum* Murray (= *H. parviflorum* L.). Although this plant is known from eastern Brazil and from northern Venezuela, no specimens have been seen from the Guianas.

Messerschmidia incana Meyer, Prim. Fl. Esseq. 92 (1818). *Tournefortia incana* Don, Gen. Syst. **4**: 368 (1838), not Lamarck (1791). *Tournefortia Meyeri* DeCandolle, Prodr. **9**: 530 (1845); Schomburgk, Fauna u. Fl. Brit. Guian. 1151 (1848).

The description given by Meyer makes it evident that this plant must be a *Heliotropium*, rather than a *Tournefortia*, if indeed it really is a member of the Boraginaceae at all. The original description strongly suggests *H. ternatum* Vahl in all but the fruit, which is given as consisting of two biovulate sub-trilocular nutlets. The type was collected on the west bank of the Essequibo River near its mouth, where it is given as growing in dry places. Until the type (probably at Goettingen) is examined the species must remain very puzzling and unplaced.

HERBARIUM, ARNOLD ARBORETUM,
HARVARD UNIVERSITY.